



## **REFERENCE GUIDE**

VERSION 15.2v5

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# Reference Guide

A reference guide for all the parameters within each node in Nuke. It does not give you any instructions on using Nuke. For details on installing and using Nuke, refer to Nuke's [online help](#).



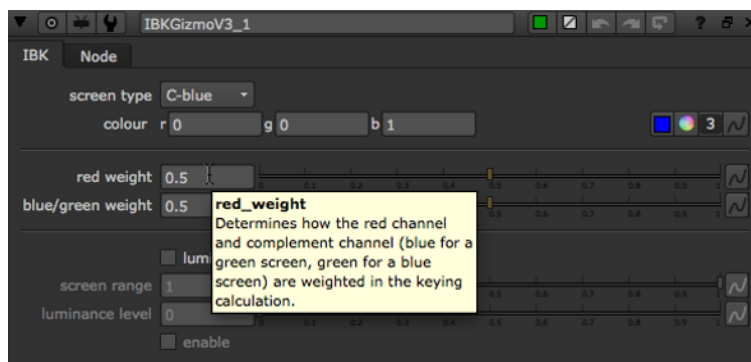
**Note:** For the most up-to-date information, please see the Nuke product page and the latest Nuke Online Help on our website at [www.foundry.com](http://www.foundry.com).

## Getting Help

Nuke features several forms of help, in a variety of locations.

### Viewing Tooltips

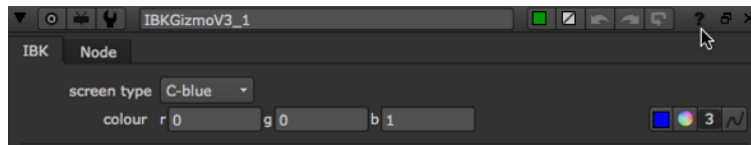
Most controls offer concise instructions in the form of tooltips. To display the tooltips, move your mouse pointer over an interface control or a node parameter.



To view a tooltip for a node, move your mouse pointer over the **?** icon in the node's Properties panel.

## Viewing the Context-Sensitive Online Help

The context-sensitive online help includes a comprehensive description of each node and its parameters. To display these descriptions in your default web browser, click the **?** icon in the node's properties panel.



### Selecting the Help Source

In Nuke, the context-sensitive help content may differ depending on what you've selected as the help source in the **Preferences**.

To select the help source:

1. Press **Shift+S** on the Node Graph to open the **Preferences** dialog.
2. Go to the **Behaviors > Documentation** tab.
3. Set **documentation source** to:
  - **local** - Use Nuke's built-in help system. This is included in the Nuke installation and does not require an Internet connection.



**Note:** When you click **?** in a node's **Properties** panel, Nuke searches the following locations for HTML files with the same name as the requested node (for example, blur.html):

1. Directories contained in the NUKE\_PATH environment variable.
2. The **/\$HOME/.nuke** and **/\$HOME/.nuke/Documentation** directories.
3. Your local **plugins** directory.
  - On Windows, this is C:\Program Files\Common Files\Nuke\15.2\plugins\
  - On Mac, this is /Library/Application Support/Nuke/15.2/plugins/
  - On Linux, this is /usr/local/Nuke/15.2/plugins/
4. The Nuke installation directory.

- **foundry** - Use the help system available on our website. This contains the most up-to-date information, but requires an Internet connection.



**Note:** On Windows, you may have to add a firewall program or port exception to view the most up-to-date help from our website. If the connection is blocked, Nuke falls back to the **local** copy.

- **custom** - Use your own custom help system.
4. If you set **documentation source** to **local**, you can either:
- enable **auto port** to automatically assign a free documentation server port, or
  - use **local port** to specify a local documentation server port manually and **port range** to define a range of ports to attempt. Typically, the **local port** value should be 1024 or higher. Setting the value to 0 causes a port to be automatically assigned.



**Note:** To be able to use the online help from multiple sessions of Nuke running at the same time, you must enable **auto port**.

5. If you set **documentation source** to **foundry**:
- the **foundry host** field displays the documentation server host address.
  - use **foundry port** to specify the documentation server port.
6. If you set **documentation source** to **custom**:
- set **custom host** to your documentation server host address. This must be an Internet Protocol version 4 (IPv4) address.
  - use **local port** to specify a local documentation server port. Typically, the **local port** value should be 1024 or higher. Setting the value to 0 causes a port to be automatically assigned.
  - use **custom port** to specify a custom documentation server port.

## Using the Help Menu

You can click the main **Help** menu to access the following:

- **Key Assignments** - a list of hot keys.
- **Documentation** - the Nuke Online Help, the Nuke Developer Kit (NDK), and documentation for using Python, TCL, and expressions in Nuke.
- **Release Notes** - important updates to features and bug fixes.
- **Training and Tutorials** - Nuke tutorial videos, and a list of other training resources.
- **Nukepedia** - an online resource containing useful information about all things Nuke.
- **Mailing Lists** - information on Nuke-related e-mail lists.
- **Plug-in Installer** - open the Nuke plug-ins page on our website, which gives you easy access to a large selection of plug-ins for Nuke.

# Contacting Customer Support

Should questions arise that the documentation fails to address, you can visit the Support Portal at [support.foundry.com](https://support.foundry.com).



# Image Nodes

Image nodes deal with loading, viewing, and rendering image sequences as well as creating built-in Nuke elements, such as checkerboards and color wheels.

## CheckerBoard

Generates a checkerboard image that you can use as a placeholder for a texture or background.



**Note:** If you enable **proxy mode** the board may not match the full resolution version, because the boxes are rounded to the nearest pixel.

### Inputs and Controls

| Control (UI)     | Knob (Scripting) | Default Value                        | Function                                                                                                                            |
|------------------|------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| CheckerBoard Tab |                  |                                      |                                                                                                                                     |
| format           | format           | Dependent on <b>Project Settings</b> | Sets the checkerboard's format. You can select a preset format or create a custom size using the <b>new</b> or <b>edit</b> options. |
| size             | boxsize          | 64                                   | Sets the size of the checkerboard boxes in pixels.                                                                                  |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| color 0 rgba          | color0           | N/A           | Sets the color of the boxes within the checkerboard starting from the bottom left-hand corner: <ul style="list-style-type: none"> <li>• <b>color 0</b> - the box at 0,0 and then every alternate box and row.</li> <li>• <b>color 1</b> - the box at 1,0 and then every alternate box and row.</li> <li>• <b>color 2</b> - the box at 1,1 and then every alternate box and row.</li> <li>• <b>color 3</b> - the box at 0,1 and then every alternate box and row.</li> </ul> |
| color 1 rgba          | color1           | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| color 2 rgba          | color2           | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| color 3 rgba          | color3           | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| line color            | linecolor        | 1             | Sets the color of the delineating line between boxes on the checkerboard.                                                                                                                                                                                                                                                                                                                                                                                                   |
| line width            | linewidth        | 0             | Sets the width, in pixels, of the delineating line between boxes on the checkerboard.                                                                                                                                                                                                                                                                                                                                                                                       |
| centerline color rgba | centerlinecolor  | N/A           | Sets the color of the center lines on the checkerboard.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| centerline width      | centerlinewidth  | 3             | Sets the width, in pixels, of the center lines on the checkerboard.                                                                                                                                                                                                                                                                                                                                                                                                         |

# ColorBars

Generates a Society of Motion Picture and Television Engineers (SMPTE) color bars test pattern, useful for color management.

## Inputs and Controls

| Control (UI)  | Knob (Scripting) | Default Value                        | Function                                                                                                                        |
|---------------|------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ColorBars Tab |                  |                                      |                                                                                                                                 |
| format        | format           | Dependent on <b>Project Settings</b> | Sets the colorbar's format. You can select a preset format or create a custom size using the <b>new</b> or <b>edit</b> options. |
| bar intensity | barintensity     | 0.5                                  | Sets the color intensity of the bars.                                                                                           |
| PAL           | PAL              | disabled                             | When enabled, NTSC specific colors are removed and only PAL colors are displayed.                                               |

## ColorWheel

Generates a color wheel image.

## Inputs and Controls

| Control (UI)   | Knob (Scripting) | Default Value                        | Function                                                                                                                                                                                        |
|----------------|------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ColorWheel Tab |                  |                                      |                                                                                                                                                                                                 |
| format         | format           | Dependent on <b>Project Settings</b> | Sets the color wheel's format. You can select a preset format or create a custom size using the <b>new</b> or <b>edit</b> options.                                                              |
| channels       | channels         | rgba                                 | The color wheel only contains these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                    |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Center Saturation | centerSaturation | 0             | Sets the HSV saturation level in the center of the color wheel.                                                                                                                                                                                             |
| Edge Saturation   | edgeSaturation   | 1             | Sets the HSV saturation level at the edges of the color wheel.                                                                                                                                                                                              |
| Center Value      | centerValue      | 1             | Sets the HSV value level in the center of the color wheel.                                                                                                                                                                                                  |
| Edge Value        | edgeValue        | 1             | Sets the HSV value level at the edges of the color wheel.                                                                                                                                                                                                   |
| gamma             | gamma            | 0.45          | Sets the overall gamma level of the color wheel.                                                                                                                                                                                                            |
| rotate            | rotate           | 0             | Sets the amount of rotation to apply to color position in the color wheel. Negative values produce clockwise rotation and vice-versa.                                                                                                                       |
| fill format       | fillFormat       | enabled       | <p>When enabled, the color wheel fills the selected format up to either the x or y axes, depending which is smaller - the color wheel always retains a 1:1 aspect ratio.</p> <p>When disabled, use the area controls to specify the color wheel's area.</p> |
| area xyrt (xywh)  | area             | N/A           | <p>Sets the area of the color wheel when <b>fill format</b> is disabled.</p> <div>  <b>Note:</b> Click <b>wh</b> to toggle between xyrt and xywh area controls. </div>   |

# Constant

Generates an image where every pixel is the same color. This includes pixels outside the image area as well as inside it.

## Inputs and Controls

| Control (UI) | Knob (Scripting) | Default Value                        | Function                                                                                                                                                                                     |
|--------------|------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Constant Tab |                  |                                      |                                                                                                                                                                                              |
| channels     | channels         | rgba                                 | The constant only contains these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| color        | color            | 0                                    | Sets the color of the constant.                                                                                                                                                              |
| format       | format           | Dependent on <b>Project Settings</b> | Sets the constant's format. You can select a preset format or create a custom size using the <b>new</b> or <b>edit</b> options.                                                              |
| frame range  | first            | 1                                    | If you intend to animate the constant, sets the frame range within which the animation is contained.                                                                                         |
|              | last             | 1                                    |                                                                                                                                                                                              |

## CurveTool

You can use this node to analyze and track the following aspects of the input sequence:

- the size and position of black areas in the sequence
- average pixel values in the sequence
- exposure changes in the sequence, and
- brightest and dimmest pixels in the sequence.

Based on the analysis, the node creates an animation curve. You can then use this curve data to drive effects elsewhere. For instance, you can add matching flicker to a CG render.

## Inputs and Controls

| Connection Type | Connection Name | Function                       |
|-----------------|-----------------|--------------------------------|
| Input           | unnamed         | The image sequence to analyze. |

| Control (UI)  | Knob (Scripting) | Default Value   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CurveTool Tab |                  |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Curve Type    | operation        | Avg Intensities | <p>Sets the curve type to pass down the node tree:</p> <ul style="list-style-type: none"> <li>• <b>Auto Crop</b> - locates black regions (or any color you pick) around the edges of the frame sequence and tracks their size and position over time. This is useful for running a Crop node to remove unnecessary outer pixels and speed up the calculation.</li> <li>• <b>Avg Intensities</b> - obtains the average pixel values in a frame sequence and then matches that intensity elsewhere. It takes the first value in the frame range and the next value selected, adds them together and divides by two, returning the average between the two. You might want to use it to match the background plate's fire flicker in the smoke in the foreground plate, for example.</li> <li>• <b>Exposure Difference</b> - analyzes the exposure changes in the frame sequence. It takes the first value in the frame range and the next value selected, and returns the difference between the two. You can use the results to match the same exposure elsewhere.</li> <li>• <b>Max Luma Pixel</b> - tracks the brightest and dimmest pixels in the frame sequence. This can be useful in the following case, for example. Let's</li> </ul> |

| Control (UI)              | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |                  |               | say you have a night-time sequence depicting a person moving inside a dark house holding a flashlight, and want to add lens flare on the moving flashlight. Knowing where the brightest pixel is located over time allows you to match-move the lens flare and position it correctly without having to manually animate it.                                                                                                                      |
| Go!                       | go               | N/A           | Click to begin analysis of the selected <b>Curve Type</b> .                                                                                                                                                                                                                                                                                                                                                                                      |
| AutoCrop                  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| color                     | color            | 0             | Sets the color detected during analysis.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Intensity Range           | ccrange          | 0             | Sets how far the color can deviate from the selected <b>color</b> and still be cropped.                                                                                                                                                                                                                                                                                                                                                          |
| Intensity                 |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| # frames for base average | avgframes        | 2             | <p>Sets the range of frames that each frame analyzed is compared against. For example, a value of 1 would compare each frame to the frame following it, whereas a value of 5 would compare each frame to the following 5 frames.</p> <div>  <b>Note:</b> The higher frame range you use, the more accurate and time-consuming the calculation becomes. </div> |

| Control (UI)                  | Knob (Scripting) | Default Value             | Function                                                                                                                                                                                                              |
|-------------------------------|------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All                           |                  |                           |                                                                                                                                                                                                                       |
| channels                      | channels         | rgba                      | <p>The selected analysis is only applied to these channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                    |
| ROI xyrt (xywh)               | ROI              | Dependent on input format | Defines the area to analyze. By default, the ROI is set to the entire input image, but you can drag the ROI indicator in the Viewer or adjust the xyrt values manually.                                               |
| AutoCropData Tab              |                  |                           |                                                                                                                                                                                                                       |
| autocropdata xyrt (xywh)      | autocropdata     | Dependent on input format | Displays the analysis results when <b>Curve Type</b> is set to <b>AutoCrop</b> . To see the animation curve, right-click on a parameter field and select <b>Curve editor</b> .                                        |
| IntensityData Tab             |                  |                           |                                                                                                                                                                                                                       |
| intensitydata                 | intensitydata    | 0                         | Displays the analysis results when <b>Curve Type</b> is set to <b>Avg Intensities</b> , or <b>Exposure Difference</b> . To see the animation curve, right-click on a parameter field and select <b>Curve editor</b> . |
| MaxLumaData Tab               |                  |                           |                                                                                                                                                                                                                       |
| Maximum Luminance Pixel xy    | maxlumapixdata   | 0, 0                      | Displays the coordinates of the pixel with the highest luminance value on the current frame.                                                                                                                          |
| Maximum Luminance Pixel Value | maxlumapixvalue  | 0                         | Displays the highest luminance value on the current frame.                                                                                                                                                            |
| Minimum Luminance Pixel xy    | minlumapixdata   | 0, 0                      | Displays the coordinates of the pixel with the lowest luminance value on the current frame.                                                                                                                           |



| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minimum Luminance Pixel Value                                                                                                                          | minlumapixvalue   | 0             | Displays the lowest luminance value on the current frame.                                                                                            |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                      |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                         |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# Profile

The Profile node allows you to measure the performance of a script by inserting the node at any point in the node tree and then using the **Profile** pane to determine the output. If you have more than one Profile node in a script, use the **profile node** dropdown in the **Profile** pane to choose which point in the script to calculate.

See Nuke's [online help](#) for more information.

## Inputs and Controls

| Control (UI)                                                                                                                                           | Knob (Scripting)   | Default Value                 | Function                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Profile Tab                                                                                                                                            |                    |                               |                                                                                                                                                                                                                   |
| channels                                                                                                                                               | channels           | rgba                          | <p>The profiling data is only calculated for these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| frame range                                                                                                                                            | frame_range        | Dependent on Project Settings | Sets the frame range for which the profiling data is calculated.                                                                                                                                                  |
| open profile panel                                                                                                                                     | open_profile_panel | N/A                           | Click to open the <b>Profile</b> pane, which determines what profiling data is collected.                                                                                                                         |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                    |                               |                                                                                                                                                                                                                   |
| before render                                                                                                                                          | beforeRender       | none                          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                      |
| before each frame                                                                                                                                      | beforeFrameRender  | none                          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                          |
| after each frame                                                                                                                                       | afterFrameRender   | none                          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.                                                              |
| after render                                                                                                                                           | afterRender        | none                          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                                                                                         |
| render progress                                                                                                                                        | renderProgress     | none                          | These functions run during rendering to determine progress or failure.                                                                                                                                            |

# Read

This node loads images from disk, using the native resolution and the frame range for the sequence. It converts all imported sequences to Nuke's native 32-bit linear RGB colorspace.

The Read node supports multiple file formats, such as Cineon, TIFF, Alembic, PSD, OpenEXR, HDRI, DPX, R3D, ARRIRAW, DNG, and RAW camera data. It uses the file name extension to determine the format.

You can also create a Read node by pressing **R** on the Node Graph.

See also [DeepRead](#), [ReadGeo](#), [AudioRead](#), and [UDIM Import](#).

## Inputs and Controls

| Control (UI)        | Knob (Scripting)   | Default Value           | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Read Tab            |                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| File                | file               | dependent on file       | Sets the file path and name of the file to read. For frame numbers, you can use ##### for each digit or the printf-style formatting %04d.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Localization Policy | localizationPolicy | from auto-localize path | <p>Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times:</p> <ul style="list-style-type: none"> <li>• <b>on</b> - the files are cached, regardless of location, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>from auto-localize path</b> - the files are cached if they reside in the <b>auto-localize from</b> directory, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>on demand</b> - only localize these source clips when you manually update them. See <a href="#">Nuke's Online Help</a> for more information.</li> <li>• <b>off</b> - the files are never cached, regardless of location.</li> </ul> |

| Control (UI) | Knob (Scripting)   | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Update       | updateLocalization | N/A               | When this Read node is set to <b>Localization Policy</b> > <b>on demand</b> , click <b>Update</b> to manually localize the files from the source files.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Format       | format             | dependent on file | Sets the format and pixel aspect ratio of the file's output. Metadata from the file header is used to determine the format, where available. You can create custom formats by clicking the <b>Format</b> dropdown and selecting <b>new</b> or <b>edit</b> to enter the required dimensions and pixel aspect ratio.                                                                                                                                                                                                                                                            |
| Proxy        | proxy              | none              | Sets the file path and name of a relevant proxy image. This proxy image is used if <b>proxy</b> mode is on and the required resolution is less than or equal to the <b>proxy format</b> .                                                                                                                                                                                                                                                                                                                                                                                     |
| Proxy Format | proxy_format       | 1024x778          | The file specified in <b>proxy</b> is read if the <b>down-rez</b> of the format is smaller or equal to this value. Typically it is guessed correctly from the file header, but you can change it to set a different pixel aspect ratio if required.                                                                                                                                                                                                                                                                                                                           |
| Frame Range  | first              | dependent on file | The first frame number of a sequence to display.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|              | before             | hold              | <p>Sets the behavior of frames before the <b>first</b> frame specified:</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - select to show a still picture of the first frame of the frame range.</li> <li>• <b>loop</b> - select to start over and keep looping the span of the frame range outside the first frame of the frame range.</li> <li>• <b>bounce</b> - select to play the span of the frame range backwards and forwards between the frame range limits.</li> <li>• <b>black</b> - select to display a black frame outside of the first frame.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | last             | dependent on file | The last frame number of a sequence to display.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|              | after            | hold              | <p>Sets the behavior of frames after the <b>last</b> frame specified:</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - select to show a still picture of the last frame of the frame range.</li> <li>• <b>loop</b> - select to start over and keep looping the span of the frame range outside the last frame of the frame range.</li> <li>• <b>bounce</b> - select to play the span of the frame range backwards and forwards between the frame range limits.</li> <li>• <b>black</b> - select to display a black frame outside of the last frame.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Frame        | frame_mode       | expression        | <p>Sets the frame mode:</p> <ul style="list-style-type: none"> <li>• <b>expression</b> - Lets you enter an expression in the field on the right. The expression changes the relation between the current frame and the frame read in. For example, if your clip begins from image.0500.rgb and you want to place this first frame at frame 1 rather than frame 500, you can use the expression <b>frame+499</b>. This way, 499 frames are added to the current frame to get the number of the frame that's read in. At frame 1, image.0500.rgb is read in; at frame 2, image.0501.rgb is read in; and so on. Another example of an expression is <b>frame*2</b>. This expression multiplies the current frame by two to get the number of the frame that's read in. This way, only every other frame in the clip is used. At frame 1, image.0002.rgb is read in; at frame 2, image.0004.rgb is read in; at frame 3, image.0006.rgb is read in; and so on.</li> <li>• <b>startat</b> - Lets you enter a start frame number in the</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |                   | <p>field on the right. This specifies the frame where the first frame in the sequence is read in. In other words, all frames are offset so that the clip starts at the specified frame. For example, if your sequence begins from image.0500.rgb and you enter <b>1</b> in the field, image0500.rgb is read in at frame 1. Similarly, if you enter <b>100</b> in the field, image0500.rgb is read in at frame 100.</p> <ul style="list-style-type: none"> <li>• <b>offset</b> - Lets you enter a constant offset in the field on the right. This constant value is added to the current frame to get the number of the frame that's read in. For example, if your clip begins from image.0500.rgb and you want to place this first frame at frame 1 rather than frame 500, you can use <b>499</b> as the constant offset. This way, 499 is added to the current frame to get the frame that's read in. At frame 1, image.0500.rgb is read in; at frame 2, image.0501 is read in, and so on. You can also use negative values as the constant offset. For example, if you use the value -10, Nuke will subtract ten from the current frame to get the frame that's read in. At frame 20, image.0010.rgb is read in; at frame 21, image.0011.rgb is read in; and so on.</li> </ul> |
|                | frame            | none              | Depending on the <b>frame</b> mode, you can enter a start frame, an offset, or an expression here.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Original Range | origfirst        | dependent on file | Displays the original first frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                | origlast         | dependent on file | Displays the original last frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Missing Frames | on_error         | error             | <p>Sets Nuke's behavior when there is a problem with frames in the file:</p> <ul style="list-style-type: none"> <li>• <b>error</b> - display an error in the Viewer.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)    | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |                   | <ul style="list-style-type: none"> <li>• <b>black</b> - replace suspect frames with a black frame.</li> <li>• <b>checkerboard</b> - replace suspect frames with a checkerboard.</li> <li>• <b>nearestframe</b> - replace suspect frames with the nearest good frame.</li> </ul>                                                                                                                                                                                                                                                                                                                                                  |
| reload          | reload           | N/A               | Click to re-read the image from disk.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Input Transform | colorspace       | dependent on file | <p>Sets the color transform used to convert this file to Nuke's <b>working space</b>.</p> <p>The <b>working space</b> is defined in the <b>Preferences</b> or <b>Project Settings</b> &gt; <b>Color Management</b> settings.</p> <p>The <b>default</b> determines the LUT from the size and type of data in the file, and other information from the file header.</p> <div>  <p><b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.</p> </div> |
| Premultiplied   | premultiplied    | disabled          | When enabled, Nuke corrects the color of the partially transparent pixels produced by most renderers by dividing color data by the alpha channel before converting from the colorspace, and then multiplying by the alpha channel afterwards.                                                                                                                                                                                                                                                                                                                                                                                    |
| Raw Data        | raw              | disabled          | <p>When enabled, Nuke does not convert the data.</p> <p>For most file formats this is the same as <b>linear</b> colorspace but, for some, it may disable other processing such as conversion from YUV.</p>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Auto Alpha      | auto_alpha       | disabled          | When enabled, if the Read produces RGB but no alpha channel, then assume the alpha should be 1 if it's requested later on.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OCIO Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Context         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| key1            | key1             | none          | OCIO Contexts allow you to apply specific LUTs to individual shots.<br><br>See Nuke's <a href="#">online help</a> for more information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| value1          | value1           | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| key2            | key2             | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| value2          | value2           | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| key3            | key3             | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| value3          | value3           | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| key4            | key4             | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| value4          | value4           | none          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sequence Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| import sequence | import sequence  | N/A           | <p>Click to display a browser to locate an import sequence script which builds a frame sequence list from the contents of an EDL file.</p> <p>These are not standard EDL files, such as CMX. Each line in the file simply defines a separate image sequence to import in the form:</p> <pre>imagesequence.%04d.ext in out head tail</pre> <p>Where in and out are the start/end frame numbers of the clip and head/tail are the number of frames to trim from the start and end.</p> <p>Each sequence in the list is expanded into the <b>sequence</b> control so that each line contains the name of the file to read for that frame:</p> <pre>line 1 = frame 1, line 10 = frame 10.</pre> <p>Finally, the script replaces the <b>Read &gt; file</b> text with:</p> <pre>[lindex [knob sequence] [frame]]</pre> |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | This looks up the file name from the <b>sequence</b> control and sets the <b>first</b> frame to 1 through to the <b>last</b> frame in the expanded list.                                                                                                                                                                                                                                                                                                                                                                                         |
| frame sequence      | sequence         | none          | <p>Most easily used in conjunction with the <b>import sequence</b> button. Each line contains the name of the file to read for that frame:</p> <p>line 1 = frame 1, line 10 = frame 10.</p> <p>Set the <b>Read &gt; file</b> control to <b>[index [knob sequence] [frame]]</b> to look up the file name from this control. This allows you to use a single Read to access multiple sequences of files where the naming does not follow any set numeric sequence, rather than using multiple Read nodes with a single file sequence per Read.</p> |
| Metadata Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| metadata viewer     | shownmetadata    | N/A           | <p>Displays the metadata of any file read in using a Read node. Once you know which keys exist in the file, you can reference them in expressions.</p> <p>The metadata displayed depends on the file type. For example, a <b>.jpg</b> might only contain <b>input/</b> keys, whereas QuickTimes contain <b>input/</b> and <b>quicktime/</b> keys.</p>                                                                                                                                                                                            |
| search metadata for | metadatafilter   | N/A           | Filter the metadata by entering text in this field. By default, only metadata containing the <b>keys</b> and                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                           |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------|
|              |                  |               | <b>values</b> entered are displayed. You can change this behavior using the <b>within</b> control. |

## File Type Specific Controls

These controls are context sensitive depending on which format you intend to render out.

### ARI

| Control (UI)                     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ARI Options</b> (ARI and MXF) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Load settings from metadata      | arriReset        | N/A           | Click to reset the <b>ARI Options</b> to those from the file metadata.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Local GPU                        | arriLocalGPUName | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> |

| Control (UI)         | Knob (Scripting)  | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|-------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |                   |  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Use GPU if available | arriUseCuda       | disabled          | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.         </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Clip Settings        |                   |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Colorspace           | arriColorspace    | dependent on clip | Sets the colorspace used to convert from raw data into the Viewer colorspace.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Exposure Index (ISO) | arriExposureIndex |                   | Sets the overall sensitivity of pixels from the raw image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| White Balance (K)    | arriWhiteBalance  |                   | Controls the relative RGB coolness and warmth. Higher values increase the warmth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Tint                 | arriTint          |                   | Adjusts the level of tints to compliment the <b>White Balance</b> control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Lens Squeeze         | arriLensSqueeze   |                   | Sets the amount of anamorphic lens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)         | Knob (Scripting)                                                           | Default Value     | Function                                                                                                                                                                                                                                                                                                            |
|----------------------|----------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                                                                            |                   | squeeze applied to the image.                                                                                                                                                                                                                                                                                       |
| Unsqueeze Anamorphic | arriUnsqueezeAnamorphic                                                    | disabled          | <p>When enabled, unsqueezes the raw file while converting it to the Viewer colorspace.</p> <div>  <b>Note:</b> This control is generally not required because the file metadata sets the pixel aspect ratio automatically. </div> |
| Processing           |                                                                            |                   |                                                                                                                                                                                                                                                                                                                     |
| Debayer Mode         | arriDebayerMode                                                            | dependent on clip | Sets the debayering mode applied to reads. If <b>Proxy Playback</b> is enabled, the debayer is ignored.                                                                                                                                                                                                             |
| ADA 5 Fine-tuning    | arriAda5FinetuningRed<br>arriAda5FinetuningGreen<br>arriAda5FinetuningBlue |                   | Fine-tunes the ADA 5 debayering in the red, green, and blue channels.                                                                                                                                                                                                                                               |
| Aspect Ratio         | arriAspectRatio                                                            |                   | Sets the output aspect ratio independent of the pixel aspect ratio.                                                                                                                                                                                                                                                 |
| Resolution           | arriResolution                                                             |                   | Set the resolution and aspect ratio that the clip is scaled to, cropping the image if required.                                                                                                                                                                                                                     |
| Sharpness            | arriSharpness                                                              |                   | Adjusts the sharpness of the image by introducing contrast at edges.                                                                                                                                                                                                                                                |
| Detail               | arriDetail                                                                 |                   | <p>Adjusts the amount of detail by affecting fine structures.</p> <div>  <b>Note:</b> The <b>Detail</b> control can introduce aliasing at higher values. </div>                                                                 |

| Control (UI)       | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Look Editor        |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                       |
| Use Look Editor    | arriUseLookEditor | enabled       | <p>When enabled, the <b>Look Editor</b> settings can be used to modify the image.</p> <div>  <b>Note:</b> The <b>Look Editor</b> settings cannot be enabled when the <b>Colorspace</b> control is set to <b>LogC</b> or <b>Scene Linear</b>. Only <b>Video</b> color spaces use <b>Look Editor</b> settings. </div> |
| Saturation         | arriSaturation    | 1             | Increases or decreases the overall saturation of the image.                                                                                                                                                                                                                                                                                                                                           |
| Slope/Offset/Power |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                       |
| Slope              | arriSlope         | 1,1,1         | Adjusts overall the <b>Slope</b> , <b>Offset</b> , and <b>Power</b> .                                                                                                                                                                                                                                                                                                                                 |
| Offset             | arriOffset        | 0,0,0         |                                                                                                                                                                                                                                                                                                                                                                                                       |
| Power              | arriPower         | 1,1,1         |                                                                                                                                                                                                                                                                                                                                                                                                       |
| Proxy Playback     | arriProxyPlayback | Off           | Setting proxy to anything other than <b>Off</b> speeds up read times, but the <b>Debayer Mode</b> is ignored.                                                                                                                                                                                                                                                                                         |

## BRAW



**Note:** Blackmagic **.braw** files are not currently supported by ACES OCIO config files, you can only use the **nuke-default** config file shipped with Nuke. Support for **.braw** files is scheduled for a future ACES release.

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BRAW Options</b>  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU            | N/A              | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | use_cuda         | disabled      | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your</p>                                                                                                                                                                                                                                                                                  |

| Control (UI)                | Knob (Scripting)  | Default Value   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|-------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             |                   |                 | operating system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Decode Resolution           | decode_resolution | Full Res        | Sets the output resolution decoded from the source file. Higher quality takes longer to decode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Decode Using                | decode_using      | Camera Metadata | Sets how the file is decoded, either using the file's encoded <b>Camera Metadata</b> or <b>Clip Custom</b> , which enables the <b>Blackmagic Design Custom</b> controls allowing you to make changes to the output in the Viewer.                                                                                                                                                                                                                                                                                                                                                                              |
| Load settings from metadata | load_settings     | N/A             | <p>Click to overwrite any changes to controls in the <b>Properties</b> panel with the camera metadata stored in the file.</p> <p>Any changes made to the <b>Properties</b> are discarded. If you want to compare your edits to the camera metadata, set <b>Decode Using</b> to <b>Camera Metadata</b> instead. That way you can toggle between your look and the original camera metadata.</p>                                                                                                                                                                                                                 |
| Update sidecar              | update_sidecar    | N/A             | <p>Click to overwrite an existing <b>.sidecar</b> file with the settings currently in the <b>Properties</b> panel.</p> <p>A <b>.sidecar</b> file contains artistic changes to the look of a <b>.braw</b> file, separate from the camera metadata stored in the <b>.braw</b> file. Sidecar files must reside in the same directory as the associated <b>.braw</b> file.</p> <p>If no <b>.sidecar</b> file exists in the same directory as the <b>.braw</b> file, Nuke creates one with the settings currently in the <b>Properties</b> panel. Clicking <b>Update sidecar</b> again overwrites the new file.</p> |
| Color Science               | viewing_bmdgen    | 5               | Sets the Blackmagic color science generation applied to the clip. Only the latest color science, <b>Gen5</b> , is currently supported. Later generations are scheduled for future releases.                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)             | Knob (Scripting)             | Default Value                | Function                                                                                                                                                                   |
|--------------------------|------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Color Space              | viewing_gamut                | Blackmagic Design            | Select the color gamut of the decoded image in the Viewer.                                                                                                                 |
| Gamma                    | viewing_gamma                | Blackmagic Design Film       | Select a gamma preset to use on the decoded image. Selecting <b>Blackmagic Design Custom</b> enables the controls under the <b>Blackmagic Design Custom</b> section below. |
| Blackmagic Design Custom |                              |                              |                                                                                                                                                                            |
| Saturation               | tone_curve_saturation        | dependent on camera metadata | Increases or decreases the overall saturation and contrast of the image.                                                                                                   |
| Contrast                 | tone_curve_contrast          |                              |                                                                                                                                                                            |
| Midpoint                 | tone_curve_midpoint          |                              | Increases or decreases the midtones, highlights, and shadows of the image.                                                                                                 |
| Highlight Rolloff        | tone_curve_highlights        |                              |                                                                                                                                                                            |
| Shadow Rolloff           | tone_curve_shadows           |                              |                                                                                                                                                                            |
| Black Level              | tone_curve_black_level       |                              | Sets the black and white levels in the image, the level of brightness at the darkest and lightest areas in the image, which affects the dynamic range of the image.        |
| White Level              | tone_curve_white_level       |                              |                                                                                                                                                                            |
| Use Video Black Level    | tone_curve_video_black_level |                              | When enabled, darken blacks to replicate video black levels.                                                                                                               |
| ISO                      | iso                          | 500                          | Sets the overall sensitivity of pixels from the raw image and can be used to control exposure.                                                                             |



| Control (UI)       | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|--------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                          |               |  <b>Note:</b> Higher ISO values can push color values above one and increase noise in some cases.                                                                                                                                                                                                                                                                                                                                                                 |
| Exposure           | exposure                 | 0             | Adjusts the exposure applied to the decoded image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Highlight Recovery | highlight_recovery       | disabled      | When enabled, areas of highlight are 'declipped' by cross-referencing other channel values to recover image data.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Gamut Compression  | gamut_compression_enable | disabled      | When enabled, the selected <b>Colorspace</b> gamut values are remapped to fit the available color value range on the output device.<br><br> <b>Note:</b> <b>Gamut Compression</b> is only applicable if <b>Use GPU if available</b> is enabled.                                                                                                                                                                                                                   |
| Apply LUT          | apply_lut                | disabled      | When enabled, embedded LUTs in the metadata or separate <b>.sidecar</b> file are applied to the image. Use the <b>LUT Source</b> control to select the source of the LUT.                                                                                                                                                                                                                                                                                                                                                                          |
| LUT Source         | post_3dlut_mode          | Disabled      | When <b>Apply LUT</b> is enabled, select the source of the embedded LUT: <ul style="list-style-type: none"> <li>• <b>Disabled</b> - no LUT is applied. This option is equivalent to disabling <b>Apply LUT</b>.</li> <li>• <b>Embedded</b> - the LUT embedded in the file metadata is applied. If no embedded LUT exists, this option is not displayed.</li> <li>• <b>Sidecar</b> - the LUT embedded in the associated <b>.sidecar</b> file is applied. If no embedded LUT exists in the <b>.sidecar</b>, this option is not displayed.</li> </ul> |
| White Balance      | whiteBalance             | As Shot       | Allows you to select a preset white balance from the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)      | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                            |
|-------------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                      |               | <p>dropdown, such as <b>Cloudy</b> or <b>Flash</b> simulation, or choose <b>Custom</b> to adjust the <b>White Balance (K)</b> and <b>Tint</b> manually.</p> <p>The default, <b>As Shot</b>, uses the <b>White Balance (K)</b> and <b>Tint</b> values from the file metadata or <b>.sidecar</b>.</p> |
| White Balance (K) | white_balance_kelvin | 4640          | Adjusts the color temperature in Kelvin, which affects blues and reds in the image.                                                                                                                                                                                                                 |
| Tint              | white_balance_tint   | -2            | Adjusts the color temperature tint, which affects greens and magentas in the image.                                                                                                                                                                                                                 |

## DNG

| Control (UI)                   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DNG Options</b>             |                  |               |                                                                                                                                                                                                                                                                                                                                                                                               |
| color space                    | dng_colorspace   | sRGB          | <p>Sets the colorspace used during debayering. The standard Read node <b>colorspace</b> control is changed to match this setting automatically.</p> <div>  <b>Note:</b> To view the data before debayering, enable the <b>raw data</b> control. </div>                                                     |
| force linear transfer function | dng_force_linear | disabled      | <p>When enabled, overrides the specified <b>color space</b> transfer function to force it to use linear.</p> <p>For some cases, such as <b>sRGB</b>, this results in slightly faster read times and sets the <b>colorspace</b> on the Read to <b>linear</b> as well.</p> <p>As a result of forcing linear, all render settings are applied in linear space, rather than the native space,</p> |

| Control (UI)  | Knob (Scripting)  | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|-------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                   |                   | so there may be differences in how the controls respond.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| white balance | dng_white_balance | As Shot           | Applies preset values to the <b>temperature</b> and <b>tint</b> controls, depending on the setting chosen: <ul style="list-style-type: none"> <li>• <b>As Shot</b> - attempts to read the <b>temperature</b> and <b>tint</b> values from the source file's metadata.</li> <li>• <b>Daylight to Flash</b> - standard presets in common usage.</li> <li>• <b>Custom</b> - adjusting the <b>temperature</b> and <b>tint</b> controls manually sets <b>white balance</b> to this value.</li> </ul> |
| temperature   | dng_temperature   | dependent on file | Defines the <b>temperature</b> , in Kelvin, and <b>tint</b> of the image white point: <ul style="list-style-type: none"> <li>• <b>temperature</b> - in general, runs from blues at low values to yellows at high values.</li> <li>• <b>tint</b> - in general, runs from greens at low values to purples at high values.</li> </ul>                                                                                                                                                             |
| tint          | dng_tint          |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| exposure      | dng_exposure      | 0                 | Controls the amount of exposure data available on top of the baseline exposure.                                                                                                                                                                                                                                                                                                                                                                                                                |
| shadows       | dng_shadows       | 0                 | Controls the amount of low-level image data available at render time.                                                                                                                                                                                                                                                                                                                                                                                                                          |

## EXR

| Control (UI)                   | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                   |
|--------------------------------|--------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EXR Options</b>             |                                |               |                                                                                                                                                                                                                            |
| offset negative display window | offset_negative_display_window | enabled       | The <b>.exr</b> format allows the image's lower left corner to start at any position, including negative x axis values. Nuke does not support this type of format, but compensates by offsetting the image or reducing the |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|                      |                  |               | <p>format size on both sides:</p> <ul style="list-style-type: none"> <li>• <b>enabled</b> - the image is offset so that the <b>.exr</b> image's left side start at x=0.</li> <li>• <b>disabled</b> - the format is reduced on both sides by the negative x amount, as if that area was overscan.</li> </ul>                                                                                                                                                                                                                                                                                     |
| do not attach prefix | noprefix         | disabled      | <p>When enabled, metadata keys are read as they are, without attaching a prefix to them.</p> <p>When disabled, the prefix <b>exr</b> is attached to metadata keys to make them distinct from other metadata in the tree.</p>                                                                                                                                                                                                                                                                                                                                                                    |
| edge pixels          | edge_pixels      | plate detect  | <p>Sets how to treat pixels at the edges of the data window, or bounding box in Nuke terms, when reading <b>.exr</b> files:</p> <ul style="list-style-type: none"> <li>• <b>plate detect</b> - if the bounding box and format match exactly, then repeat all edges. Otherwise, add black at the edges.</li> <li>• <b>edge detect</b> - for each matching edge, repeat the edge pixels. Add black at mismatched edges.</li> <li>• <b>repeat</b> - always repeat the edge pixels outside the bounding box.</li> <li>• <b>black</b> - always add black pixels outside the bounding box.</li> </ul> |

## MOV

| Control (UI)       | Knob (Scripting)   | Default Value         | Function                                                                                                     |
|--------------------|--------------------|-----------------------|--------------------------------------------------------------------------------------------------------------|
| <b>MOV Options</b> |                    |                       |                                                                                                              |
| YCbCr matrix       | mov64_ycbcr_matrix | dependent on the file | Sets the way Y'CbCr is converted to RGB. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications. |

| Control (UI)                       | Knob (Scripting)          | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|---------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Range                         | mov64_decode_video_levels | default       | Sets the minimum and maximum color range values for decoded DNxHD files. If your source file was encoded with a reduced range (0-240 for 8-bit or 0-960 for 10-bit), set source range to <b>Video Range</b> to decode the full range (0-255 for 8-bit or 0-1023 for 10-bit).                                                                                                       |
| first track only                   | mov64_first_track_only    | enabled       | <p>When enabled, only the first view present in the file is displayed, regardless of how many views the file contains.</p> <p>When disabled, and there is more than one view set up in the project settings, you can switch between views using the buttons above the Viewer.</p>                                                                                                  |
| [Metadata]<br>Do not attach prefix | mov64_no_prefix           | disabled      | <p>When enabled, the metadata accompanying the file is saved without the <b>quicktime</b> prefix.</p> <div>  <b>Note:</b> QuickTime container-specific metadata always carries the prefix. </div> <p>When disabled, all metadata is prefixed with <b>quicktime</b> for easy identification.</p> |
| [Metadata]<br>Match key format     | mov64_match_meta_format   | enabled       | <p>When enabled, Nuke attempts to clean up meta keys into the standard Nuke metadata format.</p> <p>When disabled, the metadata is passed down the Node Graph unchanged.</p>                                                                                                                                                                                                       |
| Video Codec                        | mov64_codec_name          | N/A           | Displays the codec used to encode the clip.                                                                                                                                                                                                                                                                                                                                        |

## PSD

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PSD Options</b> |                  |               |                                                                                                                                                                                                                                                                                                                                                   |
| Breakout Layers    | breakout         | N/A           | <p>Breaks out the <b>.psd</b> file into separate layers and recombines them with a number of PSDmerge nodes. The blend modes/operations in the merge nodes are approximated and do not match Photoshop® exactly.</p> <p>It's recommended that all masks and adjustment layers are rasterized in Photoshop® before they're imported into Nuke.</p> |

## R3D

| Control (UI)           | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                     |
|------------------------|------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>R3D Options</b>     |                  |                   |                                                                                                                                                                                                                                                                                                                                              |
| Image Pipeline         | r3dImagePipeline | dependent on file | <p>Sets the image pipeline to use in the Read node, <b>IPP2</b>, <b>IPP2 Custom</b>, or <b>legacy</b>. The selected <b>Image Pipeline</b> defines which controls are available in the <b>Properties</b> panel and is initially set by the file's metadata.</p> <p>See <a href="#">IPP2 Controls</a> and <a href="#">Legacy Controls</a>.</p> |
| Load Settings from RMD | r3dLoadRMD       | N/A               | Click to reload control values from the <b>.rmd</b> file metadata.                                                                                                                                                                                                                                                                           |
| Local GPU              | r3dLocalGPUName  | N/A               | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default</b></li> </ul>                                                                                                   |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <p><b>blink device</b> in the <b>Preferences</b>.</p> <ul style="list-style-type: none"> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <p><b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.</p> </div> |
| Use GPU if available | r3dUseCUDA       | disabled      | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for</p>                                                                                                                                           |

| Control (UI)      | Knob (Scripting)    | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|---------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                     |                     | more information on the GPUs supported by your operating system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Decoding          |                     |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Decode Resolution | r3dDecodeResolution | full high           | Sets the output resolution decoded from the source file. High quality takes longer to decode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Rocket Resolution | r3dRocketResolution | dependent on format | When <b>Decode Resolution</b> is set to <b>rocket custom</b> , sets the resolution values if you're using a Red Rocket card for decoding. The default values are equal to the source image.                                                                                                                                                                                                                                                                                                                                                                                           |
| Use ROCKET        | r3dUseROCKET        | disabled            | When enabled, an installed Red Rocket card is used for decoding if available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| HDRx              |                     |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| HDR Mode          | r3dHDRMode          | A frame             | <p>Sets how the high and low exposure tracks are blended for HDR clips:</p> <ul style="list-style-type: none"> <li>• <b>A frame</b> - only displays the normally exposed track with standard motion blur.</li> <li>• <b>X frame</b> - only displays the under exposed, sharper reference track.</li> <li>• <b>simple blend</b> - enables the <b>Blend Bias</b> control allowing you to blend of high and low exposure according to the bias.</li> <li>• <b>magic motion</b> - a more sophisticated automatic blend mode with a sharper image and more natural motion blur.</li> </ul> |
| Blend Bias        | r3dBlendBias        | 0                   | When <b>HDR Mode</b> is set to <b>simple blend</b> , controls the bias between low and standard exposure values, where -1 is fully the X frame and +1 is fully the A                                                                                                                                                                                                                                                                                                                                                                                                                  |



| Control (UI)           | Knob (Scripting)  | Default Value   | Function                                                                                                                                                                                                                                                                                                                    |
|------------------------|-------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                   |                 | frame.                                                                                                                                                                                                                                                                                                                      |
| <b>IPP2 Controls</b>   |                   |                 |                                                                                                                                                                                                                                                                                                                             |
| Demosaic               |                   |                 |                                                                                                                                                                                                                                                                                                                             |
| Denoise                | r3dIPP2Denoise    | 0               | Controls the amount of noise reduction applied to the image if <b>Chroma Noise Reduction</b> is disabled.                                                                                                                                                                                                                   |
| Chroma Noise Reduction | r3dIPP2Cnr        | enabled         | When enabled, applies chroma noise reduction instead of the standard <b>.r3d Denoise</b> . <div>  <b>Note: Chroma Noise Reduction</b> is only available with <b>Decode Resolution</b> set to <b>full high</b> or <b>half high</b>. </div> |
| Primary                |                   |                 |                                                                                                                                                                                                                                                                                                                             |
| Color Space            | r3dIPP2Colorspace | REDWideGamutRGB | This control is display only for the IPP2 <b>Image Pipeline</b> .                                                                                                                                                                                                                                                           |
| Gamma Curve            | r3dIPP2GammaCurve | Log3G10         | This control is display only for the IPP2 <b>Image Pipeline</b> .                                                                                                                                                                                                                                                           |
| ISO                    | r3dIPP2ISO        | 800             | Sets the overall sensitivity of pixels from the raw image.                                                                                                                                                                                                                                                                  |
| Exposure Adjust        | r3dExposureAdjust | 0               | Increases or decreases the overall exposure. This control is identical to <b>FLUT Control</b> in the legacy <b>Image Pipeline</b> .                                                                                                                                                                                         |
| Kelvin                 | r3dIPP2Kelvin     | 5600            | Controls the relative RGB coolness and warmth. Higher values increase the warmth.                                                                                                                                                                                                                                           |
| Tint                   | r3dIPP2Tint       | 0               | Adjusts the level of yellow and green                                                                                                                                                                                                                                                                                       |

| Control (UI)    | Knob (Scripting)  | Default Value         | Function                                                                                                                                                                                                                                                   |
|-----------------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                   |                       | tints. This control can help in environments where the ambient light source contains high levels of yellow and green, such as fluorescent lights.                                                                                                          |
| Grading         |                   |                       |                                                                                                                                                                                                                                                            |
| 3D LUT          | r3d3DLUT          | N/A                   | Specifies the path to a LUT file.                                                                                                                                                                                                                          |
| Enable 3D LUT   | r3dEnable3DLUT    | disabled              | When enabled, the LUT file specified in the <b>3D LUT</b> field is applied to the image.                                                                                                                                                                   |
| CDL             | r3dCDL            | N/A                   | Specifies the path to an ASC CDL file.                                                                                                                                                                                                                     |
| CC ID           | r3dCCID           | N/A                   | Specifies which color correction should be applied from CDL files containing more than one correction.                                                                                                                                                     |
| Enable CDL      | r3dEnableCdl      | N/A                   | When enabled, the CDL file specified in the <b>CDL</b> field is applied to the image.                                                                                                                                                                      |
| Slope           | r3dSlope          | 1,1,1,0               | Adjusts the <b>Slope</b> , <b>Offset</b> , <b>Power</b> , and <b>Saturation</b> manually.<br><br>If you have applied a CDL to the image, these values are set from the selected CC ID.                                                                     |
| Offset          | r3dOffset         | 0,0,0,0               |                                                                                                                                                                                                                                                            |
| Power           | r3dPower          | 1,1,1,0               |                                                                                                                                                                                                                                                            |
| Saturation      | r3dCDLSaturation  | 1                     |                                                                                                                                                                                                                                                            |
| Contrast        | r3dIPP2Contrast   | 0                     | Increases or decreases the overall contrast.<br><br><div>  <b>Note:</b> <b>Contrast</b> is disabled when <b>Gamma Curve</b> is set to <b>Half Float Linear</b>. </div> |
| Export Pipeline | r3dExportPipeline | full graded IPP2 mode | Controls whether or not creative color decisions are applied on export:<br><ul style="list-style-type: none"> <li>• <b>primary raw development</b> - all</li> </ul>                                                                                        |

| Control (UI)           | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                    |
|------------------------|------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                  |                   | <p><b>Grading</b> settings are ignored on export.</p> <ul style="list-style-type: none"> <li>• <b>full graded IPP2 mode</b> - all <b>Grading</b> settings are applied on export.</li> </ul>                                                                                                                                 |
| <b>Legacy Controls</b> |                  |                   |                                                                                                                                                                                                                                                                                                                             |
| Look                   |                  |                   |                                                                                                                                                                                                                                                                                                                             |
| Color Version          | r3dColorVersion  | v2                | Sets the color version used by the decoder.                                                                                                                                                                                                                                                                                 |
| Color Space            | r3dColorSpace    | dependent on clip | <p>Sets the colorspace used to convert from raw data into the Viewer colorspace.</p> <div>  <p><b>Note:</b> Colorspaces listed in brackets are deprecated in the current R3D SDK and may be removed in subsequent releases.</p> </div>    |
| Gamma Curve            | r3dGammaCurve    | dependent on clip | <p>Sets the gamma curve applied to the raw image data from the <b>.r3d</b> file.</p> <div>  <p><b>Note:</b> Gamma Curves listed in brackets are deprecated in the current R3D SDK and may be removed in subsequent releases.</p> </div> |
| D.E.B.                 | r3dDEB           | enabled           | When enabled, reduces the red grain that can affect midtones, darks, and shadows using DRAGON Enhanced Blacks.                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> D.E.B. is only available for clips shot with a DRAGON sensor, or later, with <b>Decode Resolution</b> set to <b>full high</b> or <b>half high</b> .                                          |
| Kelvin       | r3dKelvin        | 5600          | Controls the relative RGB coolness and warmth. Higher values increase the warmth.                                                                                                                                                                                                            |
| Tint         | r3dTint          | 0             | Adjusts the level of yellow and green tints. This control can help in environments where the ambient light source contains high levels of yellow and green, such as fluorescent lights.                                                                                                      |
| ISO          | r3dISO           | 800           | Sets the overall sensitivity of pixels from the raw image.                                                                                                                                                                                                                                   |
| FLUT Control | r3dFLUTControl   | 0             | Allows you to adjust the ISO value without clipping highlights or crushing shadows.<br><br> <b>Note:</b> <b>FLUT Control</b> is only available with <b>Color Version</b> v2 or higher.                   |
| Shadow       | r3dShadow        | 0             | Sets the image black point.<br><br> <b>Note:</b> <b>Shadow</b> is only available with <b>Color Version</b> v2 or higher. Setting <b>Gamma Curve</b> to <b>Half Float Linear</b> disables <b>Shadow</b> . |
| DRX          | r3dDRX           | 0             | Dynamic Range Extension (DRX) can be                                                                                                                                                                                                                                                         |

| Control (UI)                                                                                                                                                                                                                                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                              |                  |               | adjusted to recover clipped highlights. <div> <b>Note:</b> <b>DRX</b> is disabled for clips shot with a DRAGON sensor.</div>                                                                                |
| Saturation                                                                                                                                                                                                                                   | r3dSaturation    | 1             | Increases or decreases the overall saturation, contrast, and brightness of the image.                                                                                                                                                                                                         |
| Contrast                                                                                                                                                                                                                                     | r3dContrast      | 0             |                                                                                                                                                                                                                                                                                               |
| Brightness                                                                                                                                                                                                                                   | r3dBrightness    | 0             |                                                                                                                                                                                                                                                                                               |
| <div> <b>Note:</b> <b>Saturation</b>, <b>Contrast</b>, and <b>Brightness</b> are disabled when <b>Gamma Curve</b> is set to <b>Half Float Linear</b>.</div> |                  |               |                                                                                                                                                                                                                                                                                               |
| Exposure                                                                                                                                                                                                                                     | r3dExposure      | 0             | Increases or decreases the overall exposure.                                                                                                                                                                                                                                                  |
| RGB                                                                                                                                                                                                                                          | r3dRGBGain       | 1,1,1         | Increases or decreases the gain for the red, green, and blue channels. <div> <b>Note:</b> <b>RGB</b> gain is disabled when <b>Gamma Curve</b> is set to <b>Half Float Linear</b>.</div>                   |
| Sharpness                                                                                                                                                                                                                                    | r3dSharpness     | 0             | Sharpens the image to compensate for the OLPF low pass filter. <div> <b>Note:</b> <b>Sharpness</b> is only applicable when <b>Decode Resolution</b> is set to <b>full high</b> or <b>half high</b>.</div> |
| Denoise                                                                                                                                                                                                                                      | r3dDenoise       | 0             | Controls the amount of noise reduction applied to the image.                                                                                                                                                                                                                                  |
| Detail                                                                                                                                                                                                                                       | r3dDetail        | 2             | Sets the amount of detail extracted from                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                               |
|--------------|------------------|---------------|--------------------------------------------------------|
|              |                  |               | the image, separate from the <b>Sharpness</b> control. |



**Note:** **Denoise** and **Detail** are only applicable when **Decode Resolution** is set to **full high**.

#### Lift/Gamma/Gain

|       |          |         |                                                           |
|-------|----------|---------|-----------------------------------------------------------|
| Lift  | r3dLift  | 0,0,0,0 | Adjusts the overall black level (dark tones and shadows). |
| Gamma | r3dGamma | 1,1,1,0 | Adjusts the overall mid tones.                            |
| Gain  | r3dGain  | 1,1,1,0 | Adjusts the overall highlights.                           |



**Note:** **Lift**, **Gamma**, and **Gain** are only available with **Color Version** v2 or higher. Setting **Gamma Curve** to **Half Float Linear** disables **Lift**, **Gamma**, and **Gain**.

# UDIM Import

UDIM Import lets you import a set of texture patches that follow the UDIM numbering scheme and quickly apply them to the surface of a 3D object. Clicking on UDIM Import opens the standard **Read File(s)** file browser. Browsing to, and selecting, a sequence containing valid UDIM patches opens the **UDIM Import** dialog. The **UDIM Import** dialog lists all the UDIM patches in a sequence and provides some options for managing them. If you select a file that doesn't contain a valid UDIM number, a dialog displays explaining the problem.

UDIM Import creates a Read node for every patch in the sequence and appends a UVTile node (which allows you to modify a patch's coordinates in UV space) to each one. For more information on the UVTile node see Nuke's [online help](#).

The **UDIM Import** dialog lets you disable individual patches in a sequence, add additional files and set how the Read nodes (for each individual patch) are displayed in the Node Graph. Enabling **postage stamp** displays a thumbnail view of the patch in the Read node. Checking **group nodes** adds the nodes to a single group node for clarity.

# UnrealReader

The UnrealReader node connects NukeX or Nuke Indie to an Unreal Editor session. It makes it quick and easy for compositors to work with pixels coming out of Unreal Editor by breaking objects into rendering layers, pulling AOVs, building environment maps, and making tweaks to shot framing.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Camera          | <p>An optional input to add a render camera so that the Unreal scene is rendered using the input camera's <b>translation</b> and <b>rotation</b> and not the camera inside the Unreal sequence.</p> <div>  <b>Note:</b> You can only override <b>translation</b> and <b>rotation</b> from Unreal, the other camera values are unaffected.         </div> <p>This is a non-destructive process, the render camera does not overwrite the camera in Unreal Editor.</p> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                     |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UnrealReader Tab |                  |               |                                                                                                                                                                                              |
| Server           |                  |               |                                                                                                                                                                                              |
| Host Name        | clientHostName   | 127.0.0.1     | <p>If Unreal Editor is running on a remote machine, enter the IP address of the machine here.</p> <p>If Nuke and Unreal are running on the same machine, the default address is correct.</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Port              | clientPort       | 9000          | <p>If Unreal Editor is running on a remote machine, enter the port the machine is listening on here.</p> <p>If Nuke and Unreal are running on the same machine, the default port is correct.</p>                                                                                                                                                                                                                                         |
| Connect to Server | connectToServer  | N/A           | <p>Click to connect UnrealReader to Unreal Editor using the <b>Host Name</b> and <b>Port</b> values shown.</p> <p>You only need to click this button once to initialize the connection and the button is replaced by <b>Fetch Latest</b> when the connection is established.</p>                                                                                                                                                         |
| Fetch Latest      | fetchLatestBtn   | N/A           | <p>When the connection to Unreal Editor is established, click <b>Fetch Latest</b> to retrieve the latest updates from the Nuke Server and populate the following fields:</p> <ul style="list-style-type: none"> <li>• Maps</li> <li>• Sequences</li> <li>• Linked Camera Output</li> <li>• Available Object ID Passes</li> <li>• OCIO settings and Custom Class Render Passes from the Unreal Engine <b>Nuke Server</b> panel</li> </ul> |
| Server Version    | serverVersion    | none          | Displays the version of Nuke Server you're running under.                                                                                                                                                                                                                                                                                                                                                                                |
| Project           |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Project Path      | projectPath      | none          | Displays the file path to the Unreal Editor project you're working with currently.                                                                                                                                                                                                                                                                                                                                                       |
| Map Filter        | mapFilter        | none          | Refines the available options in the Map dropdown. Searches can contain multiple words separated by the wild card character                                                                                                                                                                                                                                                                                                              |



| Control (UI)    | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                       |               | <p>* (asterisk). For example:<br/>shot0*take001*v002</p> <p>Matches the following string:<br/>cinematics/shot001/take0014/v002</p>                                                                                                                                         |
| Check Case      | mapCaseSensitive      | disabled      | When enabled, the <b>Map Filter</b> is case-sensitive.                                                                                                                                                                                                                     |
| Map             | map                   | none          | Selects the map to use for rendering in Unreal Editor.                                                                                                                                                                                                                     |
| All Folders     | mapAllFolders         | disabled      | <p>When enabled, all folders are searched for maps, not just the <b>Project</b> folder.</p> <p>When disabled, only the <b>Project</b> folder is searched for maps.</p>                                                                                                     |
| Sequence Filter | sequenceFilter        | none          | <p>Refines the available options in the <b>Sequence</b> dropdown. Searches can contain multiple words separated by the wild card character * (asterisk). For example:<br/>shot0*take001*v002</p> <p>Matches the following string:<br/>cinematics/shot001/take0014/v002</p> |
| Check Case      | sequenceCaseSensitive | disabled      | When enabled, the <b>Sequence Filter</b> is case-sensitive.                                                                                                                                                                                                                |
| Sequence        | sequence              | none          | Selects the sequence to use for rendering in Unreal Editor.                                                                                                                                                                                                                |
| All Folders     | sequenceAllFolders    | disabled      | <p>When enabled, all folders are searched for sequences, not just the <b>Project</b> folder.</p> <p>When disabled, only the <b>Project</b> folder is searched for sequences.</p>                                                                                           |

| Control (UI)       | Knob (Scripting)  | Default Value                        | Function                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output             |                   |                                      |                                                                                                                                                                                                                                                                                                                    |
| Scene Units        | sceneUnits        | nuke                                 | Sets the unit of measure for objects in the scene, either Nuke standard or Unreal Editor.                                                                                                                                                                                                                          |
| Render Mode        | renderMode        | full image                           | Sets whether the full image or stencil layers are rendered. Setting <b>Render Mode</b> to <b>stencil layers</b> enables the <b>Layers</b> controls in the <b>Render</b> tab in the <b>Properties</b> panel, allowing you to select which layers you want from Unreal Editor.                                       |
| Render as Cubemaps | renderAsCubeMap_T | disabled                             | <p>When enabled, the selected passes are rendered as cube maps producing six renders per pass.</p> <div>  <b>Note:</b> Cryptomatte is not currently supported with cube maps. </div>                                            |
| Image Format       | imageFormat       | dependent on <b>Project Settings</b> | Sets the resolution of the script in Nuke.                                                                                                                                                                                                                                                                         |
| Overscan           | overscan          | 0                                    | Sets the number of pixels to render outside Nuke's bounding box.                                                                                                                                                                                                                                                   |
| Frame Range        | startFrame        | -1                                   | The first frame of the Unreal Editor sequence.                                                                                                                                                                                                                                                                     |
|                    | beforeStartFrame  | hold                                 | <p>Sets the behavior of frames before the <b>startFrame</b>:</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - the first frame in the sequence is held until the <b>startFrame</b> frame is reached.</li> <li>• <b>loop</b> - plays a clip loop until the <b>startFrame</b> frame is reached..</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                  | <ul style="list-style-type: none"> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce until the <b>startFrame</b> frame is reached.</li> <li>• <b>black</b> - frames are black until the <b>startFrame</b> frame is reached.</li> </ul>                                                                                                                                                                                                                                                         |
|              | endFrame         | -1               | The last frame of the Unreal Editor sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|              | afterEndFrame    | hold             | Sets the behavior of frames after the <b>endFrame</b> : <ul style="list-style-type: none"> <li>• <b>hold</b> - the last frame in the sequence is held until the <b>endFrame</b> frame is reached.</li> <li>• <b>loop</b> - plays a clip loop until the <b>endFrame</b> frame is reached..</li> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce until the <b>endFrame</b> frame is reached.</li> <li>• <b>black</b> - frames are black until the <b>endFrame</b> frame is reached.</li> </ul> |
| Write        |                  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| File         | file             | none             | Sets the file path to where the rendered files are stored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| File Type    | fileType         | exr              | Sets the file format to render. Currently only <b>.exr</b> files are supported.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Data Type    | datatype         | 16 bit half      | Sets the bit depth of the rendered <b>.exr</b> files. Currently only 16 bit half bit-depth is supported.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Compression  | compression      | Zip (1 scanline) | Sets the compression type to apply to the rendered file: <ul style="list-style-type: none"> <li>• <b>none</b></li> <li>• <b>Zip (1 scanline)</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)      | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                        |               | <ul style="list-style-type: none"> <li>• <b>Zip (16 scanline)</b></li> <li>• <b>PIZ wavelet</b></li> <li>• <b>RLE</b></li> <li>• <b>B44</b></li> <li>• <b>B44A</b></li> <li>• <b>DWAA</b></li> <li>• <b>DWAB</b></li> </ul>                                                                                                                                                 |
| Compression Level | dwCompressionLevel     | 45            | <p>Sets the quality of images compressed with the <b>DWAA</b> and <b>DWAB</b> compression types. Higher values render smaller files, but with more data loss.</p> <div>  <b>Note:</b> This control is only available when <b>Compression</b> is set to <b>DWAA</b> or <b>DWAB</b>. </div> |
| Write to Disk     | writeToDiskInUnrealMRQ | N/A           | Click to send a render job to the Unreal Movie Render Queue. The files are written to disk on the machine running Unreal Editor, which could be local or remote.                                                                                                                                                                                                            |
| Create Read Node  | createReadNode         | enabled       | <p>When enabled, clicking <b>Write to Disk</b> automatically creates a Read node referencing the output from the Unreal Movie Render Queue.</p> <p>Depending on your machine's specifications and the number of shots Unreal Editor is rendering, the Read node may be in an error state until the files are written to disk.</p>                                           |
| Read File         | reading                | disabled      | When enabled, the Read node references the files rendered from write operation,                                                                                                                                                                                                                                                                                             |

| Control (UI)        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                   |               | rather than from Unreal Editor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Render              |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Update Channel List | updateChannelList | N/A           | Click to add the selected render passes to the Nuke script. You can view the new channels by selecting them in the Viewer <b>channels</b> dropdown.                                                                                                                                                                                                                                                                                                                                                      |
| Passes              |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| [render passes]     | renderPasses      | none          | Select the render passes from the list of passes imported from Unreal Editor. Click the <b>Update Channel List</b> button to add the selected channels to the Nuke script.                                                                                                                                                                                                                                                                                                                               |
| Layers              |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Preview Layers      | previewEnabled    | disabled      | When enabled, any stencil layers present in Unreal are displayed in the Viewer. Previewing layers assigns colors to stencils makes picking stencils easier.                                                                                                                                                                                                                                                                                                                                              |
| Picker Add          | pickerAdd         | N/A           | <p>Add stencils from Unreal to the <b>Layer List</b>. This uses Nuke's eyedropper color picker.</p> <p>Click the color swatch  next to <b>Picker Add</b> and <b>Ctrl/Cmd + Click</b> a stencil in the Viewer to add it to the selection.</p> <p>Selected stencils are displayed in yellow in the <b>Viewer</b>. Multiple selections can be added. Once added, stencil names are added to the <b>Layer List</b>.</p> |
| Picker Remove       | pickerRemove      | N/A           | <p>Remove stencils from the Layer List. This uses Nuke's eyedropper color picker.</p> <p>Click the color swatch  next to <b>Picker Remove</b> and <b>Ctrl + Click</b> a stencil to</p>                                                                                                                                                                                                                              |

| Control (UI)                   | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------|-----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |                             |               | <p>remove it from the selection.</p> <p>Once removed, stencil names are also removed from the <b>Layer List</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Layer List                     | matteList                   | none          | <p>A list of currently selected layers. This list can be modified in text form or using the <b>Picker Add</b> and <b>Picker Remove</b> controls.</p> <p>The <b>Layer List</b> supports basic wildcard functionality so asterisks (*) can be used to select multiple mattes on one line. Asterisks (*) can be appended to a word to represent any number or character.</p> <div>  <b>Note:</b> For more information, see <a href="#">Using the Matte List</a>.         </div> |
| Clear                          | clear                       | N/A           | <p>Clears the <b>Layer List</b>.</p> <p>All stencils are deselected.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Remove Layer Occlusion         | removeLayerOcclusion        | disabled      | <p>When enabled, occlusions are removed from stencil layers.</p> <p>Layers that occlude layers selected in the <b>Layer List</b> are hidden and their reflections removed before rendering the output.</p> <p>When disabled, occlusions are baked into the rendered output.</p>                                                                                                                                                                                                                                                                                |
| Remove Occluding Layer Shadows | removeOccludingLayerShadows | disabled      | <p>When <b>Remove Layer Occlusion</b> is active, enabling this control removes shadows cast by hidden occluding layers.</p> <p>When disabled, hidden layers cast shadows as normal.</p>                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)                      | Knob (Scripting)             | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------|------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced Tab                      |                              |               |                                                                                                                                                                                                                                                                                                                                                                                        |
| Deferred Rendering                |                              |               |                                                                                                                                                                                                                                                                                                                                                                                        |
| Accumulator Includes Alpha        | accumulatorIncludesAlpha     | disabled      | <p>When enabled, multiple temporal or spatial sample accumulation includes an alpha channel.</p> <p>To use this control, <b>r.Postprocessing.propagateAlpha</b> must be set to 1 or 2 in Unreal Editor.</p> <div>  <b>Note:</b> Enabling this control increases processing time considerably. </div> |
| Disable Multisample Effects       | disableMultisampleEffects    | disabled      | When enabled, effects that blend pixels together, such depth of field and temporal anti-aliasing, are enabled.                                                                                                                                                                                                                                                                         |
| Use 32 Bit Post Process Materials | use32BitPostProcessMaterials | disabled      | When enabled, post process materials are written to a 32-bit render target instead of 16-bit.                                                                                                                                                                                                                                                                                          |
| Cryptomatte                       |                              |               |                                                                                                                                                                                                                                                                                                                                                                                        |
| ID Type                           | idType                       | full          | <p>Allows you to choose the segmentation type for the Cryptomatte render pass from your Unreal scene. Among the options available for Cryptomatte division are <b>per actor</b>, <b>per folder</b>, and <b>per material</b>.</p> <p>This control on applies to Cryptomatte layers selected in the <b>Render Passes</b> table.</p>                                                      |
| Anti-aliasing                     |                              |               |                                                                                                                                                                                                                                                                                                                                                                                        |
| Spatial                           | spatialSampleCount           | 1             | Sets the number of frames used to create                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)               | Knob (Scripting)      | Default Value   | Function                                                                                                                                                                                                                                                                                               |
|----------------------------|-----------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sample Count               |                       |                 | <p>one overall sample.</p> <p>Higher values increase anti-aliasing quality at the expense of processing time.</p>                                                                                                                                                                                      |
| Temporal Sample Count      | temporalSampleCount   | 1               | <p>Sets the number of frames used to produce each output frame by blending the value of sub-steps specified.</p> <p>Higher values increase anti-aliasing quality at the expense of processing time.</p>                                                                                                |
| Anti-aliasing Method       | antiAliasingMethod    | use UE4 setting | <p>Sets the anti-aliasing method to use:</p> <ul style="list-style-type: none"> <li>• use UE4 setting - anti-aliasing uses the method selected in Unreal Editor.</li> <li>• none - no anti-aliasing is applied to the output frames.</li> <li>• FXAA</li> <li>• Temporal AA</li> <li>• MXAA</li> </ul> |
| Render Warm Up Count       | renderWarmUpCount     | 0               | <p>Sets the number of frames rendered and then discarded to set up a temporal history for effects such as anti-aliasing.</p> <p>If you're not using anti-aliasing or other temporal effects, you can use a low number of warm-up frames.</p>                                                           |
| Use Camera Cut For Warm Up | useCameraCutForWarmUp | disabled        | <p>When enabled, the excess frames in the camera cut are use to determine engine warm up.</p>                                                                                                                                                                                                          |
| Engine Warm Up Count       | engineWarmUpCount     | 0               | <p>Sets the number of frames at the start of each shot that are run through without rendering. Engine warm-up frames can be used to make sure that things such as particle systems have enough time to</p>                                                                                             |



| Control (UI)              | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |                            |               | process before rendering the frames in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Render Warm Up Frames     | renderWarmUpFrames         | disabled      | <p>When enabled, the warm-up frames are processed on the GPU.</p> <p>Generally, Nuke renders and responds better with this control disabled, but some processes, like GPU particle systems, need this enabled to process their warm-up as expected.</p>                                                                                                                                                                                                                                            |
| Camera                    |                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shutter Timing            | shutterTiming              | frame center  | <p>Sets a timing bias on the shutter angle:</p> <ul style="list-style-type: none"> <li>• <b>frame open</b> - the motion to produce a frame represents the time from when the frame is rendered and onwards.</li> <li>• <b>frame center</b> - the motion to produce a frame represents half the time before the frame and half the time after the frame is rendered.</li> <li>• <b>frame close</b> - the motion to produce a frame comes from before and up to the frame being rendered.</li> </ul> |
| Color Output              |                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| OCIO Enabled              | OCIOConfigurationIsEnabled | disabled      | Controls whether or not OCIO color settings from Unreal Engine are enabled.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| OCIO Configuration Source | OCIO Transform             | None          | A read-only control displaying the OCIO config selected in Unreal Engine.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Source Color Space        | sourceColorSpace           | none          | When OCIO is enabled and a configuration is selected in Unreal Engine, choose the source and destination color spaces to convert from and to while working with                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)                 | Knob (Scripting)          | Default Value     | Function                                                                                                                                     |
|------------------------------|---------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Destination Color Space      | destinationColorSpace     | none              | Unreal content in Nuke.                                                                                                                      |
| Disable Tone Curve           | disableToneCurve          | disabled          | When enabled, the Filmic Tone Curve is applied to the output.<br><br>Disable this control if you want to write out linear <b>.exr</b> files. |
| Game Override                |                           |                   |                                                                                                                                              |
| Cinematic Quality            | cinematicQuality          | enabled           | When enabled, the engine is automatically set to the Cinematic Scalability quality for renders.                                              |
| Texture Streaming            | textureStreaming          | disable streaming | Choose whether textures are disabled, loaded over time, or fully loaded up front to avoid blurring after camera cuts.                        |
| Use LOD Zero                 | useLODZero                | enabled           | When enabled, use the highest LOD setting for meshes and particles.                                                                          |
| Disable HLODs                | disabledHLODs             | enabled           | When enabled, don't use hierarchical LOD and use the real meshes from Unreal Editor.                                                         |
| Use High Quality Shadows     | useHighQualityShadows     | enabled           | When enabled, shadow-related CVars (console variables) are replaced by high quality preset values.                                           |
| Shadow Distance Scale        | shadowDistanceScale       | 10                | Sets the shadow distance in the scene. Higher values produce better quality shadows, but at the cost of increased processing time.           |
| Shadow Radius Threshold      | shadowRadiusThreshold     | 0.001             | Sets the threshold at which shadow casters with small screen space bounding sphere values are discarded.                                     |
| Override View Distance Scale | overrideViewDistanceScale | enabled           | When enabled, the MaxDrawDistance from Unreal is overridden.                                                                                 |

| Control (UI)                   | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                 |
|--------------------------------|--------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |                          |               | MaxDrawDistance may have been reduced to improve in-game performance.                                                                                                                                                                                                                                    |
| View Distance Scale            | viewDistanceScale        | 50            | When <b>override view distance scale</b> is enabled, scale primitive's MaxDrawDistance by this value.                                                                                                                                                                                                    |
| High Resolution                |                          |               |                                                                                                                                                                                                                                                                                                          |
| Texture Sharpness Bias         | textureSharpnessBias     | 0             | Causes the engine to use a higher detailed texture if a texture's details were lowered due to screen size.<br><br>Negative values produce sharper images, up to the resolution of the texture, but may result in noisy images. You can reduce the noise by increasing the <b>Spatial Samples Count</b> . |
| Override Subsurface Scattering | overSubsurfaceScattering | disabled      | When enabled, more samples are used to improve SSS when no temporal history is available due to the tiling process.                                                                                                                                                                                      |
| Burley Sample Count            | burleySampleCount        | 64            | Sets the number of samples used by SSS when <b>override subsurface scattering</b> is enabled.                                                                                                                                                                                                            |
| Motion blur                    |                          |               |                                                                                                                                                                                                                                                                                                          |
| Disable Motion Blur            | disableMotionBlur        | disabled      | When disabled, motion blur is not calculated.                                                                                                                                                                                                                                                            |
| Camera Tab                     |                          |               |                                                                                                                                                                                                                                                                                                          |
| Translate                      | camTranslate             | 0,0,0         | Displays translation values from the Unreal Editor camera along the x, y, and z axes.                                                                                                                                                                                                                    |
| Rotate                         | camRotate                | 0,0,0         | Displays rotation values from the Unreal Editor camera around the x, y, and z axes.                                                                                                                                                                                                                      |
| Focal Length                   | focalLength              | 50            | Displays the focal length from the Unreal Editor camera.                                                                                                                                                                                                                                                 |

| Control (UI)                 | Knob (Scripting) | Default Value   | Function                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aperture x,y                 | aperture         | 24.58,<br>18.67 | Displayed aperture information from the Unreal Editor camera.                                                                                                                                                                                                                                                                                                                |
| Create Camera                | createCameraBtn  | N/A             | <p>Click to create a corresponding Camera node in Nuke with the same translate, rotate, and camera lens details.</p> <p>The new camera does not affect the camera in Unreal Editor, but it is linked to it through an expression by default.</p>                                                                                                                             |
| Link Output                  | linkOutput       | enabled         | <p>When enabled, clicking <b>Create Camera</b> adds a Camera node to the Node Graph with an expression link to the Unreal camera.</p> <p>When disabled, no link is created so the Nuke camera is totally independent from Unreal Editor.</p>                                                                                                                                 |
| [BETA] New 3D                | new3D            | disabled        | <p>Sets the 3D system with which the <b>Camera</b> is compatible:</p> <p>When enabled, clicking the <b>Camera</b> button adds a new 3D system camera to the Node Graph. New 3D system nodes are red by default.</p> <p>When disabled, clicking the <b>Camera</b> button adds a classic 3D system camera to the Node Graph. Classic 3D system nodes are green by default.</p> |
| Variables Tab                |                  |                 |                                                                                                                                                                                                                                                                                                                                                                              |
| Verify Commands and Rerender | update           | N/A             | Click to verify any variables and commands and rerender the sequence.                                                                                                                                                                                                                                                                                                        |
| [Console                     | consoleVariables | none            | You can use this table to add console                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)             | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                       |
|--------------------------|------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Variables]               |                        |               | commands.                                                                                                                                                                                                      |
| Add                      | createConsoleVariable  | N/A           | Click to add a console variable key/value pair.<br><br>Values are cached and restored after rendering.                                                                                                         |
| Delete Selected          | deleteConsoleVariables | N/A           | Click to delete the selected console variable(s).                                                                                                                                                              |
| [Start Console Commands] | startConsoleCommands   | none          | You can use this table to add commands to run when the shot starts.<br><br>If you want to restore the command after the shot is started, add a corresponding command in the <b>End Console Commands</b> table. |
| Add                      | createStartCommand     | N/A           | Click to add a start console command to execute when this shot is started.                                                                                                                                     |
| Delete Selected          | deleteStartCommands    | N/A           | Click to delete the selected start console command(s).                                                                                                                                                         |
| [End Console Commands]   | endConsoleCommands     | none          | You can use this table to restore values in the <b>Start Console Commands</b> table after the shot is finished.                                                                                                |
| Add                      | createEndCommand       | N/A           | Click to add an end console command to execute when this shot is finished.                                                                                                                                     |
| Delete Selected          | deleteEndCommands      | N/A           | Click to delete the selected end console command(s).                                                                                                                                                           |

# Viewer

The Viewer node displays the render output of any connected process nodes in the **Viewer** panel. It doesn't alter data in any way, but simply allows you to view the effect of any changes you make upstream.

You can place as many Viewer nodes in a script as you wish, which allows you to simultaneously view multiple outputs. You can also connect the output from up to ten process nodes into single Viewer node, and then cycle through the various displays. This allows you to easily compare an image before and after processing by a given effect.

You can also create this node by:

- selecting **Image > Viewer** from the Nuke Toolbar, or
- pressing **Ctrl/Cmd+I**.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The process node upstream to output to the Viewer. You can connect up to ten (0-9) nodes at once. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                        |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Viewer Tab        |                  |               |                                                                                                                                                 |
| frame_range       | frame_range      | none          | Sets the first and last frame in the playback range. You can enter frame numbers here or Cmd+drag the red triangles in the timeline.            |
|                   | frame_range_lock | on            | Click to unlock or lock playback to the frame numbers specified in <b>frame_range</b> .                                                         |
| <<<br>>>increment | frame_increment  | 10            | Sets the number of frames to step through using the Viewer << and >> buttons.                                                                   |
| channels          | channels         | rgba          | <p>Sets the channels to display in the viewer.</p> <p>You can also select a channel from a different layer to display in the alpha channel.</p> |

| Control (UI)                     | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                    |
|----------------------------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| clip_warning                     | clip_warning        | no warnings   | When set to <b>exposure</b> , any pixels that are outside the 0-1 range are Zebra-striped in the Viewer.                                                                                                                                                    |
| gain                             | gain                | 1             | Sets the amount of gain to multiply the image by before display.                                                                                                                                                                                            |
| gamma                            | gamma               | 1             | <p>Sets the amount of gamma correction to apply to the image.</p> <p>Gamma correction is applied after the <b>gain</b>, <b>viewerprocess</b>, and any custom <b>inputprocess</b>.</p>                                                                       |
| apply LUT to color channels only | rgb_only            | off           | When enabled, the LUT is applied to color channels only.                                                                                                                                                                                                    |
| downrez                          | downrez             | 1             | <p>Sets the amount of down scaling applied before display. factor to speed up rendering.</p> <p>You can use <b>downrez</b> to speed up rendering, but bear in mind that it is multiplied into any global <b>proxy</b> scale that may also be in effect.</p> |
| ignore pixel aspect              | ignore_pixel_aspect | off           | When enabled, output to the Viewer ignores the file's pixel aspect ratio and always draws using square pixels.                                                                                                                                              |
| prevent auto zoom                | zoom_lock           | off           | When enabled, the Viewer is prevented from automatically adjusting the zoom level to fit new images into the Viewer when swapping between different sized images.                                                                                           |
| show overscan                    | show_overscan       | off           | When enabled, any overscan present                                                                                                                                                                                                                          |

| Control (UI)                 | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                           |
|------------------------------|-----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                       |               | is displayed in the Viewer.                                                                                                                                                                                                                                                                                                        |
| enable full frame processing | full_frame_processing | off           | When enabled, force Nuke to render every scanline in the image. Compared to the default mode, this may take slightly longer initially and requires more space in the Viewer cache, but once Nuke has cached the frames you require, you can pan around and change the zoom level without breaking the cache or affecting playback. |
| overscan                     | overscan              | 100           | Sets the amount of overscan to show in the Viewer when <b>show overscan</b> ins enabled.                                                                                                                                                                                                                                           |
| safe zone                    | safe_zone             | no guides     | Sets the safe zone overlay to apply to the image: <ul style="list-style-type: none"> <li>• <b>no guides</b></li> <li>• <b>title safe</b></li> <li>• <b>action safe</b></li> <li>• <b>format center</b></li> </ul>                                                                                                                  |
| format center                | format_center         | off           | When enabled, the center of the format is marked with a cross in the Viewer.                                                                                                                                                                                                                                                       |
| mask region outside ratio    | masking_ratio         | square        | Sets the aspect ratio of the mask specified in the <b>mask mode</b> dropdown.                                                                                                                                                                                                                                                      |
| mask mode                    | masking_mode          | no mask       | Sets the mask overlay to apply to the image: <ul style="list-style-type: none"> <li>• <b>no mask</b></li> <li>• <b>lines</b></li> <li>• <b>half</b></li> </ul>                                                                                                                                                                     |



| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | • <b>full</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| center f-stop   | center_fstop     | 8             | <p>Sets the f-stop to display when gain is set to 1. You can use zero to show stops as +/-n.</p> <div>  <b>Note:</b> If you want a non-integer value, enter a formula to get an accurate value, otherwise the display does not round to normal f-stop names. For instance, instead of 5.6 you would use <code>pow(2,2.5)</code> to get 5.65685 </div>                                      |
| shutter angle   | shutter_angle    | 180           | <p>Sets the camera shutter angle from 0-360 degrees.</p> <p>This is used in combination with the Viewer's playback <b>fps</b> setting to compute exposure values.</p>                                                                                                                                                                                                                                                                                                         |
| gl buffer depth | gl_buffer_depth  | float         | <p>Sets the OpenGL buffer depth and enables the use of the GPU for the Viewer process and input process:</p> <ul style="list-style-type: none"> <li>• <b>byte</b> - converts to 8-bit with error diffusion.</li> <li>• <b>half-float</b> - converts to 16-bit (half) float.</li> <li>• <b>float</b> - uses a full 32-bit floating point texture (may be very slow on some cards).</li> </ul> <p>In half and full float modes, the GPU can be used to apply Viewer effects</p> |

| Control (UI)                     | Knob (Scripting)             | Default Value  | Function                                                                                                                                                                                                                                                                                         |
|----------------------------------|------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  |                              |                | <p>like gamma and the LUT in a Viewer process.</p> <div>  <b>Note:</b> You can choose a default value for this setting in the <b>Preferences</b> or by using <b>knobDefault()</b> in a startup script. </div> |
| use GPU for viewer when possible | useGPUForViewer              | on             | <p>When enabled, Viewer effects (like <b>gain</b>, <b>gamma</b>, and viewer process node) are applied using the GPU when possible.</p> <p>The 'when possible' clause is due to the fact that in some cases, like when the GL buffer depth is 8-bit, effects must be computed in the CPU.</p>     |
| use GPU for input when possible  | useGPUForInputs              | on             | <p>When enabled, compute nodes connected to the Viewer input on the GPU when possible, though not all nodes have a GPU implementation.</p>                                                                                                                                                       |
| disabled GPU dithering           | disableGPUDitherForViewer    | off            | <p>When enabled, GPU dithering is allowed in the Viewer (which affects half-float and float modes).</p>                                                                                                                                                                                          |
| dithering algorithm              | GPUDitherAlgorithmFor Viewer | high frequency | <p>Sets the frequency of dithering applied to GPU enabled compositing Viewers, so that you can be sure you're working in a consistent environment:</p> <ul style="list-style-type: none"> <li>• <b>high frequency</b> - the default setting, applies a high frequency</li> </ul>                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>dithering algorithm in screen space, after any viewer rescaling is applied. As you pan and zoom the Viewer, dithered pixels remain the same scale.</p> <ul style="list-style-type: none"> <li>• <b>low frequency</b> - applies a low frequency dithering algorithm in image space, before any viewer rescaling is applied. As you zoom in the Viewer, dithered pixels get bigger.</li> <li>• <b>no dithering</b> - disables GPU dithering.</li> </ul> |



**Note:** When the Viewer AB mode is changed to **wipe** or **stack**, the state of the GPU acceleration controls is stored, GPU acceleration is turned off, and GPU acceleration is disabled.

When the Viewer AB mode is changed back to default, GPU acceleration is re-enabled and the state of the GPU acceleration controls is restored.

|                |               |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|---------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| view transform | viewerProcess | sRGB | <p>Sets the Viewer Process operation applied to the viewed image before it is displayed on the screen. It is typically used to convert from linear to your monitor's colorspace.</p> <div>  <p><b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.</p> </div> <p>You can add your own processes to</p> |
|----------------|---------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Control (UI)           | Knob (Scripting)     | Default Value         | Function                                                                                                                                                                                                                                                                                                                              |
|------------------------|----------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                      |                       | the dropdown using the Python <b>nuke.ViewerProcess.register()</b> function.                                                                                                                                                                                                                                                          |
| input process          | input_process_node   | VIEWER_INPUT          | Sets the name of a node to process through for viewing when the <b>IP</b> button is activated. If the node does not exist, the <b>IP</b> button has no effect.                                                                                                                                                                        |
|                        | input_process        | disabled              | <p>Applies the <b>input process</b> node before displaying the image.</p> <p>To define the node to use, enter its name in the <b>input process</b> field or, from the Node Graph right-click menu, select <b>Edit &gt; Node &gt; Use as Input Process</b>.</p>                                                                        |
| input process order    | viewerInputOrder     | before viewer process | <p>Sets when the <b>input process</b> node specified is applied:</p> <ul style="list-style-type: none"> <li>• before viewer process.</li> <li>• after viewer process.</li> </ul>                                                                                                                                                      |
| viewer selector mode   | viewerSelectorMode   | rectangle selection   | <p>Sets the selection mode for the current Viewer:</p> <ul style="list-style-type: none"> <li>• <b>rectangle selection</b></li> <li>• <b>ellipse selection</b></li> <li>• <b>lasso selection</b></li> </ul>                                                                                                                           |
| viewer transform space | viewerTransformSpace | object                | <p>Sets the transform space to use in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>object</b> - transforms in this space are relative to the object itself and its orientation. For example, translating on the X axis in <b>object</b> space might shift its position on the Z axis in <b>world</b> space.</li> </ul> |

| Control (UI)          | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------|-----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                       |               | <ul style="list-style-type: none"> <li>• <b>screen</b> - transforms in this space are relative to the screen, the flat plane of your monitor, and its orientation. You can only translate on the X and Y axes, the Z axis is disabled.</li> <li>• <b>world</b> - transforms in this space are defined by the XYZ axes of the scene in Nuke's 3D Viewer. The mini axes drawn at the bottom left of the Viewer always show world space no matter what space you're working in.</li> </ul> |
| 3D Tab                |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| renderer              | renderer              | GL            | <p>Currently, only one Hydra delegate is available in Nuke, the <b>GL</b> renderer, which handles the USD-based geometry. Classic 3D system geometry is still drawn with Nuke's classic renderer, regardless of which Hydra render delegate you choose.</p> <p>In future releases, more render delegates will be made available.</p>                                                                                                                                                    |
| Lighting              | enableLighting        | on            | <p>Enable or disable lights, materials, shadows, and progressive rendering in the 3D Viewer, depending on which 3D system you're using.</p>                                                                                                                                                                                                                                                                                                                                             |
| Materials             | enableSceneMaterials  | on            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Shadows               | shadowsEnabled        | on            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Progressive Rendering | progressive_rendering | on            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display Purposes  | display_render   | on            | <p>Controls whether objects with a <b>Purpose</b> assigned in the new 3D system are visible or not.</p> <div>  <b>Note:</b> Objects with <b>Purpose</b> set to <b>default</b> are always visible in the scene. </div>                                                                                                                                                                                            |
|                   | display_proxy    | off           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                   | display_guides   | off           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Refine Level      | refine_level     | 0             | <p>Sets the level of refinement on subdivided prims in the new 3D system. Higher values produce better visual results, but at the cost of performance.</p> <div>  <b>Note:</b> The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene. </div>                                                                                                                                      |
| grid position xyz | grid_origin      | 0, 0, 0       | Sets the position of the grid in the 3D Viewer on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| display           | display          | unchanged     | <p>Adjust the display characteristics of 3D objects. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides all 3D objects.</li> <li>• <b>wireframe</b> - displays only the outlines of object geometry.</li> <li>• <b>solid</b> - displays all object geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>individual object's geometry outlines.</p> <ul style="list-style-type: none"> <li>• <b>textured</b> - displays only the surface texture of objects.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change object display modes.</li> </ul> <div>  <b>Note:</b> This setting can override individual object settings.         </div> |
| transparency   | use_alpha        | on            | When enabled, objects appear transparent where their alpha is < 1.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| headlamp       | gl_lighting      | off           | When enabled, objects are shaded with a spotlight attached to the viewpoint to make their shape visible.                                                                                                                                                                                                                                                                                                                                                                                             |
| alpha clipping | gl_alpha_clip    | 1             | Sets the alpha value used by the <b>transparency</b> control which determines if an object is opaque or not.                                                                                                                                                                                                                                                                                                                                                                                         |
| polygon offset | gl_poly_offset   | 1             | Sets the visibility of lines in hidden-line mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| show           | show_points      | off           | When enabled, all points are displayed in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                | show_point_num   | off           | When enabled, all points are numbered in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | show_point_info  | off           | When enabled, all points are labeled with xyz coordinates in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                          |
|--------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------|
|              | show_point_normals  | off           | When enabled, all available point normals are displayed in the 3D Viewer.                                                         |
|              | show_point_uvs      | off           | When enabled, all available point uvs are displayed in the 3D Viewer.                                                             |
|              | show_vertex_num     | off           | When enabled, all vertices are labeled in the 3D Viewer.                                                                          |
|              | show_vertex_normals | off           | When enabled, all available vertex normals are displayed in the 3D Viewer.                                                        |
|              | show_vertex_uvs     | off           | When enabled, all available vertex uvs are displayed in the 3D Viewer.                                                            |
|              | show_prim_num       | off           | When enabled, all primitives are labeled in the 3D Viewer.                                                                        |
|              | show_prim_normals   | off           | When enabled, all primitive normals are labeled in the 3D Viewer.                                                                 |
|              | show_prim_bbox      | off           | When enabled, all primitive bounding boxes are labeled in the 3D Viewer.                                                          |
|              | grid_display        | on            | When enabled, a grid displays in the 3D Viewer.                                                                                   |
| default lens | default_lens        | 1             | Sets the default lens (focal length divided by film width) to use in 3D mode when no camera is selected.                          |
| near         | near                | 0.1           | Sets the limit of the OpenGL near clipping plane. Objects closer to the camera than this value are not rendered in the 3D Viewer. |
| far          | far                 | 1000          | Sets the limit of the OpenGL far clipping plane. Objects farther away                                                             |



| Control (UI)   | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                    |
|----------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                       |               | <p>from the camera that this value are not rendered the 3D Viewer.</p> <p>The <b>far</b> clipping plane can be moved farther away if objects in the scene are farther away. In this case, the <b>near</b> plane is also moved so that the ratio between <b>near</b> and <b>far</b> planes is preserved.</p> |
| skew order     | skew_order            | XY            | <p>Sets the order in which skew operations are applied.</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - Skew on the X axis is applied before skew on the Y axis.</li> <li>• <b>YX</b> - Skew on the Y axis is applied before skew on the X axis.</li> </ul>                                        |
| Soft Selection |                       |               |                                                                                                                                                                                                                                                                                                             |
| Soft Select    | softSelect            | disabled      | <p>When enabled, soft selection is applied to any selection made in the Viewer.</p> <p>When disabled, selections are made in the same way as legacy versions of Nuke.</p>                                                                                                                                   |
| Falloff Radius | softSelectRadius      | 1             | Controls the radius of the selection falloff added to the initial selection. Increasing the value includes selections from farther away from the initial points or faces.                                                                                                                                   |
| Falloff Curve  | softSelectActiveCurve | S-shaped      | Sets the curve used to describe falloff farther away from the initial points or faces.                                                                                                                                                                                                                      |
| curves         | softSelectCurves      | none          | Adjusts the preset curve selected in the left-hand panel. You can also                                                                                                                                                                                                                                      |

| Control (UI)       | Knob (Scripting) | Default Value   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |                 | <p>add your own curve to control falloff using the + button.</p> <p>Adding a custom curve adds it to the <b>Falloff Curve</b> dropdown.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| MonitorOut Tab     |                  |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Enable Monitor Out | enable           | enabled         | <p>When enabled, the Viewer output is sent to a floating window, NDI session, or monitor out device, such as AJA or Blackmagic Design card. The type of output is specified using the <b>Device</b> dropdown.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Device             | device           | Floating Window | <p>Sets the Viewer output destination:</p> <ul style="list-style-type: none"> <li>• <b>Floating Window</b> - Nuke's native monitor out uses a floating monitor and does not require additional hardware.</li> <li>• <b>NDI</b> - A network protocol that enables video, and metadata signals to be sent over standard IP networks in real-time. This option allows you to easily share a stream of the Viewer output with anyone else on the network.</li> </ul> <div>  <p><b>Note:</b> To view the NDI stream, you need the NDI Monitor application installed. See <a href="#">NDI Monitor Out</a> for more information.</p> </div> <ul style="list-style-type: none"> <li>• <b>Dedicated Monitor Out Card</b> - Nuke supports various AJA and</li> </ul> |

| Control (UI)              | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|--------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |                          |               | Blackmagic devices that can be selected from the <b>Device</b> dropdown after installation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Minimize with Application | minimizedWithApplication | enabled       | <p>When enabled, minimizing Nuke also minimizes the Floating Window monitor out feed.</p> <p>When disabled, minimizing Nuke has no effect on the Floating Window.</p> <div>  <b>Note:</b> This control is only displayed when <b>Device</b> is set to <b>Floating Window</b>. </div>                                                                                                                                                                                                                                   |
| Input Setup               |                          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| AB Mode                   | monitorOutABMode         | Active Buffer | <p>Select the view mode using the <b>AB Mode</b> dropdown:</p> <ul style="list-style-type: none"> <li>• <b>Active Buffer</b> - the monitor always shows the output from the buffer currently in use by the selected Viewer.</li> <li>• <b>Buffer A</b> - the monitor always shows the output from the selected Viewer buffer A.</li> <li>• <b>Buffer B</b> - the monitor always shows the output from the selected Viewer buffer B.</li> <li>• <b>Interactive</b> - the monitor shows the output from the selected Viewer including the A/B player mode currently in use, such as <b>wipe</b>.</li> </ul> |
| Input Process             |                          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)              | Knob (Scripting)             | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------|------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use Input Process         | monitorOutInoutProcessActive | disabled      | <p>Enable <b>Use Input Process</b> to apply an input process node before displaying the image on the external monitor or floating window. This allows you to display different color information in Nuke's Viewer and monitor or floating window.</p> <p>To define the node to use, enter its name in the Viewer node's <b>input process</b> field or, from the Node Graph right-click menu, select <b>Edit &gt; Node &gt; Use as Input Process</b>.</p> |
| Output Setup              |                              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Display Mode              | monitorOutDisplayMode        | From Source   | <p>Select the resolution output from the monitor card currently in use. The resolutions available depend on the card manufacturer.</p> <div>  <b>Note:</b> Floating monitor out always uses the resolution of the Viewer in use. </div>                                                                                                                             |
| Pixel Format              | monitorOutPixelFormat        | 8 bit         | <p>Select the pixel format output from the monitor card currently in use. The formats available depend on the card manufacturer.</p>                                                                                                                                                                                                                                                                                                                     |
| Use Viewer Gamma and Gain | monitorOutUseViewerGammaGain | disabled      | <p>Enable <b>Use Viewer Gamma and Gain</b> to apply the active Viewer's filtering, gamma, and gain to the monitor out.</p>                                                                                                                                                                                                                                                                                                                               |
| Vertical Flip             | monitorOutVerticalFlip       | disabled      | <p>Enable <b>Vertical Flip</b> to flip the output vertically. This control is</p>                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)                      | Knob (Scripting)          | Default Value        | Function                                                                                                                                                                                                                                                         |
|-----------------------------------|---------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                           |                      | handy if you're using a ceiling mounted projector.                                                                                                                                                                                                               |
| Horizontal Flop                   | monitorOutHorizontalFlop  | disabled             | Enable <b>Horizontal Flip</b> to flop the output horizontally.                                                                                                                                                                                                   |
| Output Transform                  | monitorOutOutputTransform | None                 | Select the color transform to apply to the image. If you've specified an OCIO configuration file in the preferences, these custom LUTs are also applicable.                                                                                                      |
| Color Gamut                       | monitorOutHdrColorGamut   | Rec.2020             | Sets the color gamut sent as part of HDR metadata signals.                                                                                                                                                                                                       |
| Electro-Optical Transfer Function | monitorOutEOTFHDRMetadata | Perceptual Quantizer | Sets the electro-optical transfer function (EOTF) to apply to HDR displays: <ul style="list-style-type: none"> <li>• Perceptual Quantizer - the default method for viewing HDR output.</li> <li>• Hybrid Log Gamma - used for HLG compatible devices.</li> </ul> |

# Write

This node renders the result of all upstream nodes and saves the result to disk. You would usually place one Write node at the bottom of the compositing tree to render the final output. However, Write nodes have both input and output connectors, so you can embed them anywhere in the compositing tree.

The Write node supports multiple file formats, such as Cineon, TIFF, QuickTime, Alembic, OpenEXR, HDRI, and DPX.

Note that this node executes all renders at the currently active scale: either full- or proxy-resolution. To toggle between these, press **Ctrl/Cmd+P**.

You can also create this node by pressing **W** on the Node Graph.

See also [WriteGeo](#).

## Inputs and Controls

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Write Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| channels     | channels         | rgb           | <p>Sets the channels to render.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the controls on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| file         | file             | none          | <p>Sets the file path and name of the file to render. For frame numbers, you can use <b>####</b> for each digit or the printf-style formatting <b>%04d</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| proxy        | proxy            | none          | <p>Sets the file path and name of a relevant proxy image. This proxy image is used if <b>proxy</b> mode is on and the required resolution is less than or equal to the <b>proxy format</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| frame        | frame_mode       | expression    | <p>Sets the frame mode:</p> <ul style="list-style-type: none"> <li>• <b>expression</b> - Lets you enter an expression in the field on the right. The expression changes the relation between the currently processed frame and the numbering of the frame written out. The resulting file name for the current frame is displayed on the Write node in the Node Graph. For example, if your clip begins from frame 500 and you want to name that frame image.0001.exr rather than image.0500.exr, you can use the expression <b>frame-499</b>. This way, 499 frames are subtracted from the current frame to get the number for the frame written out. Frame 500 is written out as image.0001.exr, frame 501 is written out as image.0002.exr, and so on. Another example of an expression is <b>frame*2</b>. This expression multiplies the current frame by</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value                 | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |                               | <p>two to get the number of the frame that's written out. At frame 1, image.0002.exr is written out; at frame 2, image.0004.exr is written out; at frame 3, image.0006.exr is written out; and so on.</p> <ul style="list-style-type: none"> <li>• <b>startat</b> - Lets you enter a start frame number in the field on the right. This specifies the frame number given to the first frame in the sequence. The numbering of the rest of the frames is offset accordingly. For example, if your sequence begins from frame 500 and you enter <b>1</b> in the field, frame 500 is written out as image.0001.exr, frame 501 as image.0002.exr, and so on. Similarly, if you enter <b>100</b> in the field, frame 500 is written out as image.0100.exr.</li> <li>• <b>offset</b> - Lets you enter a constant offset in the field on the right. This constant value is added to the current frame to get the number for the frame that's written out. For example, if your clip begins from frame 500 and you want to render this first frame as image.0001.exr rather than image.0500.exr, you can use <b>-499</b> as the constant offset. This way, 499 is subtracted from the current frame to get the number for the frame that's written out. At frame 500, image.0001.exr is written out; at frame 501, image.0002.exr is written out, and so on.</li> </ul> |
|                  | frame            | none                          | Depending on the <b>frame</b> mode, you can enter a start frame, an offset, or an expression here.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| output transform | colorspace       | dependent on <b>file type</b> | <p>Sets the color transform used to convert this file from Nuke's <b>working space</b> to the values written in the file.</p> <p>The <b>working space</b> is defined in the <b>Preferences</b> or <b>Project Settings &gt; Color Management</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)  | Knob (Scripting) | Default Value                                                   | Function                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |                                                                 | <p>settings.</p> <p>The <b>default</b> determines the LUT from the size and type of data in the file, and other information from the file header.</p> <div>  <b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release. </div> |
| premultiplied | premultiplied    | disabled                                                        | When enabled, Nuke corrects the color to reproduce the partially transparent pixels created by some renders by dividing color data by the alpha channel before converting to the colorspace, and then multiplying by the alpha channel afterwards.                                                                                                                                                      |
| raw data      | raw              | disabled                                                        | <p>When enabled, Nuke does not convert the data.</p> <p>For most file formats this is the same as <b>linear</b> colorspace but, for some, it may disable other processing such as conversion from YUV.</p>                                                                                                                                                                                              |
| views         | views            | dependent on Compositing environment<br><b>Project Settings</b> | When you're working with stereo footage, select the required view to render.                                                                                                                                                                                                                                                                                                                            |
| file type     | file_type        | none                                                            | Sets the rendered file format manually, enabling type specific controls. See Nuke's <a href="#">online help</a> for more information.                                                                                                                                                                                                                                                                   |



| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               |  <b>Note:</b> If <b>file type</b> is left blank, Nuke attempts to guess the format and disables any file type specific controls.                                                                                                               |
| create directories | create_directories | disabled      | <p>When enabled, the render operation creates the directory structure specified in the <b>file</b> control automatically, if it doesn't already exist.</p> <p>When disabled, attempting to write to non-existent directories displays an error.</p>                                                                             |
| render order       | render_order       | 1             | When multiple nodes are rendered at once, they are sorted into increasing order by this number.                                                                                                                                                                                                                                 |
| Render             | Render             | N/A           | Click to display the pre-Render setup window.                                                                                                                                                                                                                                                                                   |
| frame range        | first              | 1             | Sets the first frame of a sequence to render.                                                                                                                                                                                                                                                                                   |
|                    | last               | 1             | Sets the last frame of a sequence to render.                                                                                                                                                                                                                                                                                    |
| limit to range     | use_limit          | disabled      | <p>When enabled, only frames within the <b>frame range</b> are rendered.</p> <div>  <b>Note:</b> If the specified frames are outside the sequence range, the Write node behaves as if it is disabled.         </div>                         |
| read file          | reading            | disabled      | When enabled, the newly written file is passed down the node tree instead of the input.                                                                                                                                                                                                                                         |
| missing frames     | on_error           | error         | <p>Sets Nuke's behavior when there is a problem with frames in the file:</p> <ul style="list-style-type: none"> <li>• <b>error</b> - display an error in the Viewer.</li> <li>• <b>black</b> - render suspect frames with a black frame.</li> <li>• <b>checkerboard</b> - render suspect frames with a checkerboard.</li> </ul> |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                   |               | <ul style="list-style-type: none"><li>• <b>nearestframe</b> - render suspect frames with the nearest good frame.</li></ul>                                                          |
| Reload                                                                                                                                                 | reload            | N/A           | Click to re-read the image from disk.                                                                                                                                               |
| read all lines                                                                                                                                         | read_all_lines    | disabled      | When enabled, upstream Read nodes read whole frames, rather than line by line. This is currently limited to <b>.dpx</b> files, but can speed up scripts containing I/O-heavy Reads. |
| OCIO Tab                                                                                                                                               |                   |               |                                                                                                                                                                                     |
| Context                                                                                                                                                |                   |               |                                                                                                                                                                                     |
| key1                                                                                                                                                   | key1              | none          | OCIO Contexts allow you to apply specific LUTs to individual shots.<br><br>See Nuke's <a href="#">online help</a> for more information.                                             |
| value1                                                                                                                                                 | value1            | none          |                                                                                                                                                                                     |
| key2                                                                                                                                                   | key2              | none          |                                                                                                                                                                                     |
| value2                                                                                                                                                 | value2            | none          |                                                                                                                                                                                     |
| key3                                                                                                                                                   | key3              | none          |                                                                                                                                                                                     |
| value3                                                                                                                                                 | value3            | none          |                                                                                                                                                                                     |
| key4                                                                                                                                                   | key4              | none          |                                                                                                                                                                                     |
| value4                                                                                                                                                 | value4            | none          |                                                                                                                                                                                     |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                     |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                        |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                            |
| after each                                                                                                                                             | afterFrameRender  | none          | These functions run after each frame is finished                                                                                                                                    |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                  |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------|
| frame           |                  |               | rendering. They are not called if the render aborts. If they throw an exception, the render aborts.       |
| after render    | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts. |
| render progress | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                    |

## File Type Specific Controls

These controls are context sensitive depending on which format you intend to render.

### CIN

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------|
| edge code    | edge_code        | none          | Sets the sequence's edge code, carried in the metadata, in the following format: 00 00 00 0000 0000 00. |

### DPX

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                       |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data type    | datatype         | 10 bit        | Sets the bit depth of the rendered .dpx files: <ul style="list-style-type: none"> <li>• 8-bit</li> <li>• 10-bit</li> <li>• 12-bit</li> <li>• 16-bit</li> </ul> |
| fill         | fill             | disabled      | When enabled, 10- and 12-bit data is compressed by                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | removing unused parts of the image.                                                                                                                                                                          |
| big endian   | bigEndian        | enabled       | When enabled, the rendered file is big-endian, rather than native-endian. Big-endian files take longer to render, but some applications only accept big-endian files.                                        |
| transfer     | transfer         | (auto detect) | Set the <b>Transfer header</b> in the rendered <b>.dpx</b> files.<br><br>By default, Nuke attempts to set the header according to the LUT used, but the <b>transfer</b> control allows you to override this. |

## EXR

| Control (UI)             | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|--------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| write ACES compliant EXR | write_ACES_compliant_EXR | disabled      | <p>When enabled, the rendered <b>.exr</b> files are ACES compliant.</p> <ul style="list-style-type: none"> <li>The <b>datatype</b> and <b>compression</b> controls are disabled. ACES compliant <b>.exr</b> files written from Nuke are always 16-bit half float with no compression.</li> <li>An extra metadata field, <b>chromaticities</b> is written into the file.</li> </ul> <div>  <b>Note:</b> ACES restricts EXR writing to single-layer RGB or RGBA.         </div> |
| autocrop                 | autocrop                 | disabled      | When enabled, the bounding box is reduced to the none zero area of the image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)         | Knob (Scripting) | Default Value                                                   | Function                                                                                                                                                                                                                                                                                                 |
|----------------------|------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |                                                                 |  <b>Note:</b> Autocrop is slow to process and generally not required, though some applications are able to read autocropped images more quickly.                                                                        |
| datatype             | datatype         | 16 bit half                                                     | Sets the bit depth of the rendered <b>.exr</b> files: <ul style="list-style-type: none"> <li>• 16-bit half</li> <li>• 32-bit float</li> </ul>                                                                                                                                                            |
| compression          | compression      | Zip (1 scanline)                                                | Sets the compression type to apply to the rendered file.<br><br> <b>Note:</b> Selecting <b>DWAA</b> or <b>DWAB</b> as the <b>compression</b> setting allows you to specify the <b>compression level</b> using a slider. |
| heroview             | heroview         | dependent on Compositing environment<br><b>Project Settings</b> | Sets the view labeled as the main view in multi-view projects.                                                                                                                                                                                                                                           |
| metadata             | metadata         | default metadata                                                | Determines what metadata is included with the rendered file: <ul style="list-style-type: none"> <li>• no metadata</li> <li>• default metadata</li> <li>• default metadata and exr/*</li> <li>• all metadata except input/*</li> <li>• all metadata</li> </ul>                                            |
| do not attach prefix | noprefix         | disabled                                                        | When enabled, unknown metadata keys are written into the file as they are.<br><br>When disabled, unknown metadata keys have                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value              | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                            | the prefix <b>nuke</b> attached to them when they are written into the file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| interleave   | interleave       | channels, layers and views | <p>Sets the interleave strategy for channels, layers, and views with a rendered <b>.exr</b> file. A single- or multi-part <b>.exr</b> file is created as described by the following options, with layers and parts sorted alphabetically:</p> <ul style="list-style-type: none"> <li>• <b>channels, layers and views</b> - creates a single-part <b>.exr</b> file ensuring backward compatibility with applications that use OpenEXR 1.x.</li> <li>• <b>channels and layers</b> - creates a multi-part <b>.exr</b> file with one part per view. This can improve Read performance as Nuke only reads the part associated with the specified view.</li> <li>• <b>channels</b> - creates a multi-part <b>.exr</b> with one part per layer.</li> </ul> <p>Interleaving is done between elements within a section (part) of <b>.exr</b> files. Interleaving channels, layers, and views is done when the whole <b>.exr</b> is written out in one large part. This is quicker for writing but it involves more work when reading only part of the data.</p> <p>For performance, you should interleave only those elements which are expected to be read together. If you're only reading some layers in each Read node, then it's best not to interleave the layers.</p> <p>If you expect to read all the layers in each Read node, then you can optimize write performance by bundling everything together. Generally, there are a lot of layers in <b>.exr</b> file so this</p> |

| Control (UI)               | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                        |
|----------------------------|----------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                            |               | control can make a big difference to both read and write performance.                                                                                                                                                                                                                           |
| first part                 | first_part                 | none          | When the <b>channels</b> control is set to <b>all</b> and <b>interleave</b> is set to <b>channels</b> , this dropdown specifies which channel is written first in multi-channel <b>.exr</b> files. All subsequent channels are written in alphanumeric order.                                   |
| standard layer name format | standard layer name format | disabled      | <p>When enabled, the rendered EXRs follow the standard <b>.exr</b> format <b>layer.view.channel</b></p> <div>  <b>Note:</b> Older versions of Nuke use <b>view.layer.channel</b> for <b>.exr</b> files. </div> |
| write full layer names     | write_full_layer_names     | disabled      | <p>When enabled, always write the layer name in the channel names, following the EXR standard.</p> <p>When disabled, follow the legacy Nuke method of storing the layer name in the part name of multi-part files.</p>                                                                          |
| truncate channel names     | truncateChannelNames       | disabled      | <p>When enabled, channel names are truncated to a maximum of 31 characters for legacy Nuke compatibility.</p> <p>When disabled, channel names are not truncated.</p>                                                                                                                            |

## JPEG

| Control (UI) | Knob (Scripting) | Default Value | Function                                            |
|--------------|------------------|---------------|-----------------------------------------------------|
| quality      | _jpeg_quality    | 0.75          | Sets the quality of the rendered JPGs.              |
| sub-sampling | _jpeg_sub_       | 4:1:1         | Sets the chroma sub-sampling to use, from lowest to |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                        |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------|
|              | sampling         |               | highest quality:<br><ul style="list-style-type: none"> <li>• 4:1:1</li> <li>• 4:2:2</li> <li>• 4:4:4</li> </ul> |

## MOV

| Control (UI) | Knob (Scripting) | Default Value                                                   | Function                                                                                 |
|--------------|------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Codec        | mov64_codec      | Apple ProRes                                                    | Sets the codec to use during rendering. See the codec subsections for specific controls. |
| FPS          | mov64_fps        | dependent on Compositing environment<br><b>Project Settings</b> | Sets the playback frames per second for the output file.                                 |

**Animation Codec**

|              |                    |           |                                                                                                                                                                                                                                                                                                               |
|--------------|--------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pixel Format | mov64_pixel_format | RGB 8-bit | Lists pixel formats supported by the current codec:<br><ul style="list-style-type: none"> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Audio File   | mov64_audiofile    | N/A       | Allows you to specify a separate audio file to include in the output.<br><br>Either enter the file path manually or click the browse button to locate the audio file.                                                                                                                                         |
| Audio Offset | mov64_audio_offset | 0         | Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.<br><br>Negative values cause the audio to start before the video                                                                                           |



| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                      |               | and vice versa.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Units          | mov64_units          | Seconds       | Sets the unit of measure for the <b>audio offset</b> control: <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                          |
| Advanced       |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Data Range     | dataRange            | Video Range   | Sets the minimum and maximum color range values for encoding DNx files: <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                               |
| Fast Start     | mov64_fast_start     | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Write Timecode | mov64_write_timecode | enabled       | When enabled, a time code track is added to the rendered <b>.mov</b> file.<br><br>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist. <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code.           </div> |
| GOP Size       | mov64_gop_size       | 12            | Sets how many frames can be placed together to form a compression GOP (group of pictures). <div>  <b>Note:</b> Use caution with this control as large alterations can stop other applications reading the rendered file.           </div>                                                                                                                                                       |

| Control (UI)              | Knob (Scripting)         | Default Value          | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|--------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Apple ProRes Codec</b> |                          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Codec Profile             | mov_prores_codec_profile | ProRes 4:2:2 HQ 10-bit | <p>Sets the codec profile to use when a ProRes codec is selected in the <b>Codec</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| YCbCr Matrix              | mov64_ycbcr_matrix_type  | Auto                   | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p>                                                                                                                                                                                          |
| Audio File                | mov64_audiofile          | N/A                    | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Audio Offset              | mov64_audio_offset       | 0                      | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                                                                                                                                                                                                                    |
| Units                     | mov64_units              | Seconds                | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)     | Knob (Scripting)          | Default Value             | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|---------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced         |                           |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Data Range       | dataRange                 | Video Range               | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                                                                                                                                  |
| Fast Start       | mov64_fast_start          | enabled                   | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Write Timecode   | mov64_write_timecode      | enabled                   | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div>                                                                                                              |
| Avid DNxHD Codec |                           |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Codec Profile    | mov64_dnxhd_codec_profile | DNxHD 444 10-bit 440 Mbit | <p>Sets the codec profile to use when a DNxHD codec is selected in the <b>Codec</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Audio File       | mov64_                    | N/A                       | Allows you to specify a separate audio file to include in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | audiofile            |               | <p>the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                                                                     |
| Audio Offset   | mov64_audio_offset   | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                                                                                                             |
| Units          | mov64_units          | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                       |
| Advanced       |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Data Range     | dataRange            | Video Range   | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                            |
| Fast Start     | mov64_fast_start     | enabled       | <p>When enabled, MOVs are playable while still down loading during streaming.</p>                                                                                                                                                                                                                                                                                                                                                                                                      |
| Write Timecode | mov64_write_timecode | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <p><b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code.</p> </div> |

| Control (UI)            | Knob (Scripting)                  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Avid DNxHR Codec</b> |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Codec Profile           | mov64_<br>dnxhr_codec_<br>profile | 4:4:4 12-bit  | <p>Sets the codec profile to use when a DNxHR codec is selected in the <b>Codec</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Audio File              | mov64_<br>audiofile               | N/A           | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Audio Offset            | mov64_<br>audio_offset            | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                                                                                                                                                                                                                   |
| Units                   | mov64_units                       | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Advanced</b>         |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Data Range              | dataRange                         | Video Range   | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                                                                                                                                  |

| Control (UI)       | Knob (Scripting)         | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|--------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fast Start         | mov64_fast_start         | enabled          | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Write Timecode     | mov64_write_timecode     | enabled          | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div>                                                                                                                |
| <b>H.264 Codec</b> |                          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Codec Profile      | mov64_h264_codec_profile | High 4:2:0 8-bit | <p>Sets the codec profile to use when a DNxHR codec is selected in the <b>Codec</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Quality            | mov64_quality            | High             | <p>Selects a preset level that automatically adjusts the <b>Advanced</b> controls. Higher values produce larger files with better quality.</p> <p>Select <b>Custom</b> to adjust the <b>Advanced</b> controls manually.</p>                                                                                                                                                                                                                                                                                                                                                                  |
| YCbCr Matrix       | mov64_ycbcr_matrix_type  | Auto             | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color</p>                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                    |
|----------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                      |               | matrix to use, including <b>Format-based</b> , which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.                                                                                                                                                  |
| Audio File     | mov64_audiofile      | N/A           | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                |
| Audio Offset   | mov64_audio_offset   | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                  |
| Units          | mov64_units          | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                            |
| Advanced       |                      |               |                                                                                                                                                                                                                                                                                                                                                             |
| Data Range     | dataRange            | Video Range   | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul> |
| Fast Start     | mov64_fast_start     | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                  |
| Write Timecode | mov64_write_timecode | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p>                                                                                                 |

| Control (UI)        | Knob (Scripting)        | Default Value     | Function                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                         |                   | <div> <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code.</div>                                                                                                                        |
| GOP Size            | mov64_gop_size          | 12                | <p>Sets how many frames can be placed together to form a compression GOP (group of pictures).</p> <div> <b>Note:</b> Use caution with this control as large alterations can stop other applications reading the rendered file.</div>                  |
| B Frames            | mov64_b_frames          | 0                 | <p>Sets the maximum number of B frames that can be consecutive in the rendered file.</p> <p>The default, 0, does not impose any maximum number of B frames in the output.</p>                                                                                                                                                          |
| Bitrate             | mov64_bitrate           | 28000             | Sets the target bitrate that the codec attempts to reach, within the limits set by the <b>Bitrate Tolerance</b> and <b>Quantizer Min/Max</b> controls.                                                                                                                                                                                 |
| Bitrate Tolerance   | mov64_bitrate_tolerance | 0                 | Sets the amount that the bitrate can vary from the <b>Bitrate</b> setting. Setting this tolerance too low can result in renders failing.                                                                                                                                                                                               |
| Quantizer Min       | mov64_quality_min       | 1                 | Sets the quality range within which the codec can vary the image to achieve the specified bitrate. Higher ranges can introduce image degradation.                                                                                                                                                                                      |
| Quantizer Max       | mov64_quality_max       | 3                 |                                                                                                                                                                                                                                                                                                                                        |
| Motion JPEG A Codec |                         |                   |                                                                                                                                                                                                                                                                                                                                        |
| Pixel Format        | mov64_pixel_format      | YCbCr 4:4:4 8-bit | <p>Lists pixel formats supported by the current codec:</p> <ul style="list-style-type: none"><li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li></ul> |



| Control (UI) | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|-------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                         |               | <ul style="list-style-type: none"> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul>                                                                                                                                               |
| Quality      | mov64_quality           | High          | <p>Selects a preset level that automatically adjusts the <b>Advanced</b> controls. Higher values produce larger files with better quality.</p> <p>Select <b>Custom</b> to adjust the <b>Advanced</b> controls manually.</p>                                                                                                                                                                          |
| YCbCr Matrix | mov64_ycbcr_matrix_type | Auto          | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p> |
| Audio File   | mov64_audiofile         | N/A           | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                         |
| Audio Offset | mov64_audio_offset      | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                           |
| Units        | mov64_units             | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                     |
| Advanced     |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)        | Knob (Scripting)        | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|-------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Range          | dataRange               | Video Range       | Sets the minimum and maximum color range values for encoding DNx files: <ul style="list-style-type: none"><li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li><li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li></ul>                                                                                                                            |
| Fast Start          | mov64_fast_start        | enabled           | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Write Timecode      | mov64_write_timecode    | enabled           | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div> <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code.</div> |
| Bitrate             | mov64_bitrate           | 200000            | Sets the target bitrate that the codec attempts to reach, within the limits set by the <b>Bitrate Tolerance</b> and <b>Quantizer Min/Max</b> controls.                                                                                                                                                                                                                                                                                                                       |
| Bitrate Tolerance   | mov64_bitrate_tolerance | 4000000           | Sets the amount that the bitrate can vary from the <b>Bitrate</b> setting. Setting this tolerance too low can result in renders failing.                                                                                                                                                                                                                                                                                                                                     |
| Quantizer Min       | mov64_quailty_min       | 1                 | Sets the quality range within which the codec can vary the image to achieve the specified bitrate. Higher ranges can introduce image degradation.                                                                                                                                                                                                                                                                                                                            |
| Quantizer Max       | mov64_quailty_max       | 3                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Motion JPEG B Codec |                         |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Pixel Format        | mov64_pixel_format      | YCbCr 4:4:4 8-bit | Lists pixel formats supported by the current codec:                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|-------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                         |               | <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Quality      | mov64_quality           | High          | <p>Selects a preset level that automatically adjusts the <b>Advanced</b> controls. Higher values produce larger files with better quality.</p> <p>Select <b>Custom</b> to adjust the <b>Advanced</b> controls manually.</p>                                                                                                                                                                                                                                                                 |
| YCbCr Matrix | mov64_ycbcr_matrix_type | Auto          | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set of heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p>                                                                                       |
| Audio File   | mov64_audiofile         | N/A           | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                |
| Audio Offset | mov64_audio_offset      | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                                                                                                                  |
| Units        | mov64_units             | Seconds       | Sets the unit of measure for the <b>audio offset</b> control:                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)      | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|-------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                         |               | <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                     |
| Advanced          |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Data Range        | dataRange               | Video Range   | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                     |
| Fast Start        | mov64_fast_start        | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Write Timecode    | mov64_write_timecode    | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div> |
| Bitrate           | mov64_bitrate           | 200000        | Sets the target bitrate that the codec attempts to reach, within the limits set by the <b>Bitrate Tolerance</b> and <b>Quantizer Min/Max</b> controls.                                                                                                                                                                                                                                                                                                                          |
| Bitrate Tolerance | mov64_bitrate_tolerance | 4000000       | Sets the amount that the bitrate can vary from the <b>Bitrate</b> setting. Setting this tolerance too low can result in renders failing.                                                                                                                                                                                                                                                                                                                                        |
| Quantizer Min     | mov64_quality_min       | 1             | Sets the quality range within which the codec can vary the image to achieve the specified bitrate. Higher ranges can introduce image degradation.                                                                                                                                                                                                                                                                                                                               |
| Quantizer         | mov64_                  | 3             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)        | Knob (Scripting)        | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max                 | quality_max             |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>MPEG-4 Codec</b> |                         |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Pixel Format        | mov64_pixel_format      | YCbCr 4:2:0 8-bit | <p>Lists pixel formats supported by the current codec:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Quality             | mov64_quality           | High              | <p>Selects a preset level that automatically adjusts the <b>Advanced</b> controls. Higher values produce larger files with better quality.</p> <p>Select <b>Custom</b> to adjust the <b>Advanced</b> controls manually.</p>                                                                                                                                                                                                                                                                                                                            |
| YCbCr Matrix        | mov64_ycbcr_matrix_type | Auto              | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p>                                                                                                                                                   |
| Audio File          | mov64_audiofile         | N/A               | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                                                                           |
| Audio Offset        | mov64_audio_offset      | 0                 | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p>                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                      |               | Negative values cause the audio to start before the video and vice versa.                                                                                                                                                                                                                                                                                                                                                                                                       |
| Units          | mov64_units          | Seconds       | Sets the unit of measure for the <b>audio offset</b> control: <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                       |
| Advanced       |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Data Range     | dataRange            | Video Range   | Sets the minimum and maximum color range values for encoding DNx files: <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                            |
| Fast Start     | mov64_fast_start     | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Write Timecode | mov64_write_timecode | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div> |
| GOP Size       | mov64_gop_size       | 12            | <p>Sets how many frames can be placed together to form a compression GOP (group of pictures).</p> <div>  <b>Note:</b> Use caution with this control as large alterations can stop other applications reading the rendered file. </div>                                                                                                                                                       |

| Control (UI)      | Knob (Scripting)        | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|-------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B Frames          | mov64_b_frames          | 0                 | <p>Sets the maximum number of B frames that can be consecutive in the rendered file.</p> <p>The default, 0, does not impose any maximum number of B frames in the output.</p>                                                                                                                                                                                                                                                                                                                                                                       |
| Limit Bitrate     | mov64_limit_bitrate     | disabled          | <p>When enabled, the maximum <b>Bitrate</b> is capped and the <b>Bitrate Tolerance</b> is set to 0.</p> <p>This control is designed to reduce output file size, but the render quality is generally lower.</p>                                                                                                                                                                                                                                                                                                                                      |
| Bitrate           | mov64_bitrate           | 200000            | Sets the target bitrate that the codec attempts to reach, within the limits set by the <b>Bitrate Tolerance</b> and <b>Quantizer Min/Max</b> controls.                                                                                                                                                                                                                                                                                                                                                                                              |
| Bitrate Tolerance | mov64_bitrate_tolerance | 4000000           | Sets the amount that the bitrate can vary from the <b>Bitrate</b> setting. Setting this tolerance too low can result in renders failing.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Quantizer Min     | mov64_quality_min       | 1                 | Sets the quality range within which the codec can vary the image to achieve the specified bitrate. Higher ranges can introduce image degradation.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Quantizer Max     | mov64_quality_max       | 3                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PHOTO JPEG Codec  |                         |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Pixel Format      | mov64_pixel_format      | YCbCr 4:4:4 8-bit | <p>Lists pixel formats supported by the current codec:</p> <ul style="list-style-type: none"><li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li><li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li></ul> |
| Quality           | mov64_quality           | High              | Selects a preset level that automatically adjusts the <b>Advanced</b> controls. Higher values produce larger files                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|-------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                         |               | <p>with better quality.</p> <p>Select <b>Custom</b> to adjust the <b>Advanced</b> controls manually.</p>                                                                                                                                                                                                                                                                                             |
| YCbCr Matrix | mov64_ycbcr_matrix_type | Auto          | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p> |
| Audio File   | mov64_audiofile         | N/A           | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                         |
| Audio Offset | mov64_audio_offset      | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                           |
| Units        | mov64_units             | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                     |
| Advanced     |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data Range   | dataRange               | Video Range   | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                          |



| Control (UI)      | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|-------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fast Start        | mov64_fast_start        | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                    |
| Write Timecode    | mov64_write_timecode    | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div> |
| Bitrate           | mov64_bitrate           | 200000        | Sets the target bitrate that the codec attempts to reach, within the limits set by the <b>Bitrate Tolerance</b> and <b>Quantizer Min/Max</b> controls.                                                                                                                                                                                                                                                                                                                        |
| Bitrate Tolerance | mov64_bitrate_tolerance | 4000000       | Sets the amount that the bitrate can vary from the <b>Bitrate</b> setting. Setting this tolerance too low can result in renders failing.                                                                                                                                                                                                                                                                                                                                      |
| Quantizer Min     | mov64_quality_min       | 1             | Sets the quality range within which the codec can vary the image to achieve the specified bitrate. Higher ranges can introduce image degradation.                                                                                                                                                                                                                                                                                                                             |
| Quantizer Max     | mov64_quality_max       | 3             | Quantizer Max                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>PNG Codec</b>  |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Pixel Format      | mov64_pixel_format      | RGB 16-bit    | <p>Lists pixel formats supported by the current codec:</p> <ul style="list-style-type: none"> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul>                                                                                                                                                             |
| Audio File        | mov64_audiofile         | N/A           | Allows you to specify a separate audio file to include in the output.                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                   |
|--------------|--------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                    |               | Either enter the file path manually or click the browse button to locate the audio file.                                                                                                                                                   |
| Audio Offset | mov64_audio_offset | 0             | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p> |
| Units        | mov64_units        | Seconds       | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                           |

## Advanced

|                |                      |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data Range     | dataRange            | Video Range | <p>Sets the minimum and maximum color range values for encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                     |
| Fast Start     | mov64_fast_start     | enabled     | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Write Timecode | mov64_write_timecode | enabled     | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code. </div> |

## Uncompressed Codec

| Control (UI) | Knob (Scripting)        | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|-------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pixel Format | mov64_pixel_format      | YCbCr 4:2:2 10-bit | <p>Lists pixel formats supported by the current codec:</p> <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| YCbCr Matrix | mov64_ycbcr_matrix_type | Auto               | <p>Sets the way RGB is converted to Y'CbCr. <b>Rec 601</b> and <b>Rec 709</b> follow the ITU.BC specifications.</p> <p><b>Auto</b> uses a set a heuristics to determine the best color matrix to use, including <b>Format-based</b>, which sets the color matrix to <b>Rec 601</b> for formats with a width below 840 pixels and <b>Rec 709</b> for formats with a width of 840 pixels or above.</p>                                                                                                                                                   |
| Audio File   | mov64_audiofile         | N/A                | <p>Allows you to specify a separate audio file to include in the output.</p> <p>Either enter the file path manually or click the browse button to locate the audio file.</p>                                                                                                                                                                                                                                                                                                                                                                           |
| Audio Offset | mov64_audio_offset      | 0                  | <p>Sets the start time of any audio file specified in the <b>Audio File</b> control. The unit of measure is specified using the <b>Units</b> control.</p> <p>Negative values cause the audio to start before the video and vice versa.</p>                                                                                                                                                                                                                                                                                                             |
| Units        | mov64_units             | Seconds            | <p>Sets the unit of measure for the <b>audio offset</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b></li> <li>• <b>Frames</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |
| Advanced     |                         |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Data Range   | dataRange               | Video Range        | Sets the minimum and maximum color range values for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                      |               | <p>encoding DNx files:</p> <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                                                                               |
| Fast Start     | mov64_fast_start     | enabled       | When enabled, MOVs are playable while still down loading during streaming.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Write Timecode | mov64_write_timecode | enabled       | <p>When enabled, a time code track is added to the rendered <b>.mov</b> file.</p> <p>You can also use the quicktime/reel metadata, if present, to give the track its reel name. You can add this key using the ModifyMetaData node if it doesn't exist.</p> <div>  <p><b>Note:</b> The <b>input/timecode</b> key must be present in the sequence metadata in order to write a time code.</p> </div> |

## MXF

| Control (UI) | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                          |
|--------------|-----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Codec        | mx_f_video_codec_knob | Avid DNxHR    | Sets the codec to use during rendering.                                                                                                                                                                                                                                                                                           |
| Pattern      | mx_f_op_pattern_knob  | OP-1a         | <p>Sets the operational pattern of the rendered file:</p> <ul style="list-style-type: none"> <li>• <b>OP-1a</b> - combines video into a single file, similar to Final Cut Pro X.</li> <li>• <b>OP-Atom</b> - writes one video file, but the name will have _v1 at the end of the name, similar to Avid Media Composer.</li> </ul> |

| Control (UI)  | Knob (Scripting)        | Default Value                                                   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|-------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FPS           | mx_f_edit_rate_knob     | dependent on Compositing environment<br><b>Project Settings</b> | Sets the playback frames per second for the output file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Codec Profile | mx_f_codec_profile_knob | 4:4:4 12-bit                                                    | Lists codec profiles supported by the current codec: <ul style="list-style-type: none"> <li>• <b>Pixel layout</b> - 420, 422, 444, and so on. This defines how the chroma channels in the buffer are arranged. 444 buffers have lower spatial chroma sampling than 422, so they are generally preferred when available.</li> <li>• <b>Pixel bit-depth</b> - 8-bit, 16-bit, and so on. This sets the encoding depth used when decompressing the frames. A large bit depth gives higher accuracy at the cost of speed and memory usage.</li> </ul> |
| Tape ID       | mx_f_tape_id_knob       | N/A                                                             | When <b>Pattern</b> is set to <b>OP-Atom</b> , specifies a tape name that can be read by Avid Media Composer.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Advanced      |                         |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Data Range    | dataRange               | Full Range                                                      | Sets the minimum and maximum color range values for encoding DNx files: <ul style="list-style-type: none"> <li>• <b>Full Range</b> - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit).</li> <li>• <b>Video Range</b> - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).</li> </ul>                                                                                                                                                                                             |

## PNG

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------|
| data type    | datatype         | 8 bit         | Sets the bit depth of the rendered <b>.png</b> files: <ul style="list-style-type: none"> <li>• 8-bit</li> <li>• 16-bit</li> </ul> |

## SGI

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                              |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data type    | datatype         | 8 bit         | Sets the bit depth of the rendered <b>.sgi</b> files: <ul style="list-style-type: none"> <li>• 8-bit</li> <li>• 16-bit</li> </ul>                                     |
| big endian   | bigEndian        | enabled       | When enabled, the rendered file is big-endian, rather than native-endian. Big-endian files take longer to render, but some applications only accept big-endian files. |
| compression  | compression      | RLE           | Sets the compression type to apply to the rendered file.                                                                                                              |

## TARGA

| Control (UI) | Knob (Scripting) | Default Value | Function                                                 |
|--------------|------------------|---------------|----------------------------------------------------------|
| compression  | compression      | RLE           | Sets the compression type to apply to the rendered file. |

## TIFF

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data type    | datatype         | 8 bit         | Sets the bit depth of the rendered <b>.tiff</b> files: <ul style="list-style-type: none"> <li>• 8-bit</li> <li>• 16-bit</li> <li>• 32-bit float</li> </ul> |
| compression  | compression      | Deflate       | Sets the compression type to apply to the rendered file.                                                                                                   |

## YUV

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------|
| interlaced   | interlaced       | disabled      | When enabled, the file is rendered as interlaced rather than progressive. |

# Draw Nodes

Draw nodes contain roto shapes, paint tools, film grain, fills, lens flares, sparkles, and other vector-based image tools.

## Dither

Dither adds random noise to an image to hide color quantization effects. Color quantization is a reduction in the number of colors used in the image, and can occur, for example, if the image has been stored into an 8-bit file without error diffusion. In a dithered image, colors that are not available are approximated by a diffusion of colored pixels from within the available palette. The human eye perceives the diffusion as a mixture of the colors within it. This produces an impression of a larger number of colors and eliminates banding artifacts.

See also [Noise](#), [Grain](#), [ScannedGrain](#), and [F\\_ReGrain](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence with unwanted color quantization effects.                                                                                                                                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the dither effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dither Tab   |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| amount       | amount           | 0.1           | Up to 0.5 of this amount is added or subtracted from each pixel to create the effect. Higher values produce more dither and vice versa.                                                               |
| monodither   | monodither       | disabled      | When enabled, the same dithering pattern is used for all channels.                                                                                                                                    |
| seed         | seed             | 1             | The same pattern is usually produced for each Dither node. Changing the <b>seed</b> number produces a different pattern, for instance if you're using multiple Dither nodes.                          |
| static seed  | static_seed      | disabled      | When enabled, the dither pattern remains the same for every frame producing a constant dither effect.                                                                                                 |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                         |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the dither effect is limited to the non-black areas of this channel.                                                                                        |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                          |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the dither effect is limited to the non-white areas of the mask.                                                                                          |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the dither before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one Dither node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full dither effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# DustBust

DustBust allows you to remove dirt and scratches from scanned images by painting over them with pixels from another frame or another part of the same frame. It clones multiple areas from a source to a destination based on dust points you create by **Ctrl/Cmd**+clicking in the Viewer. The source position can be different for each dust point.

See also [RotoPaint](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                        |
|-----------------|-----------------|-------------------------------------------------|
| Input           | unnamed         | The image with the dirt or scratches to remove. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DustBust Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                 |
| enable        | enable           | 1             | Sets the effect intensity from 0-1, where 1 is equal to the full effect.                                                                                                                                                                                                                                                                                        |
| view source   | view_source      | disabled      | When enabled, you can view the source frame for the points currently in the Viewer.                                                                                                                                                                                                                                                                             |
| frame offset  | frame_offset     | 1             | <p>The clone source can be on the same frame (value 0) or on another frame determined by the frame offset.</p> <div>  <b>Note:</b> Frame offset is the same to all dust points on a particular frame (but frame offset can be animated over time if desired).         </div> |
| edge hardness | edge_hardness    | 0.5           | Sets the edge softness for all dust points on a particular frame.                                                                                                                                                                                                                                                                                               |
| Output Mask   | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                   |
|               | maskchannel      | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                         |

# Flare

This node simulates lens flares that are created by reflections between lenses inside a film or video camera when the camera is pointed towards a bright light source, such as the sun. Lens flares are typically added to compositions to create a sense of realism, implying that the image is an un-edited shot of a real life scene.

Lens flares are generally round, oval, or roundish with five or six flattened sides. They tend to show chroma shifting, generating rainbow-like outlines. Nuke flares are implemented as a donut-like shape. They have three radii:

- The outer radius is the outside of the donut.
- The middle radius is the thickest part.
- The inner radius is where the donut hole would be.

You can define two colors for the flare: the color of the donut itself and the fill color for the donut hole. If these two colors are the same, flares are rendered as disks.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to add lens flares. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flare Tab    |                  |               |                                                                                                                                                                                                                                                                                              |
| Position     |                  |               |                                                                                                                                                                                                                                                                                              |
| position     | position         | 100, 300      | <p>Sets the center position of the flare on the x and y axes.</p> <p>You can reposition the flare along an imaginary line between <b>position</b> and the center of the image using the <b>offset</b> control. In this case, set <b>position</b> to the coordinates of the light source.</p> |
| offset       | offset           | 0             | Adjusts the flare along a line between the center of the                                                                                                                                                                                                                                     |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | image at 0 and the <b>position</b> , or light source, at 1.                                                                                                                                                                                                                                                                                                              |
| radius        | radius           | 80, 100, 120  | <p>Sets the size of the flare as described by three radii:</p> <ul style="list-style-type: none"> <li>• <b>inner</b> - sets the size of the 'hole' filled by the <b>inner color</b> control.</li> <li>• <b>middle</b> - sets the thickness of the donut filled by the <b>ring color</b> control.</li> <li>• <b>outer</b> - sets the outer limit of the donut.</li> </ul> |
| size mult     | size_mult        | 1             | Scales the flare globally, while retaining the ratio described by the <b>radius</b> controls.                                                                                                                                                                                                                                                                            |
| anamorph      | anamorph         | 1             | Simulates anamorphic lens flares by altering the default 1:1 flare shape.                                                                                                                                                                                                                                                                                                |
| Colors        |                  |               |                                                                                                                                                                                                                                                                                                                                                                          |
| ring color    | ring_color       | 1             | Sets the ring color of the flare donut. Flares fade from black at the <b>outer</b> radius to the ring color on the <b>middle</b> radius.                                                                                                                                                                                                                                 |
| inner color   | inner_color      | 0.5           | Sets the inner color of the flare donut. Flares fade from the ring color on the <b>middle</b> radius to the inner color on the <b>inner</b> radius.                                                                                                                                                                                                                      |
| outer falloff | outer_falloff    | 1             | Sets the blending or falloff between the outer radius and the background image.                                                                                                                                                                                                                                                                                          |
| inner falloff | inner_falloff    | 1             | Sets the blending or falloff between the inner radius and the background image.                                                                                                                                                                                                                                                                                          |
| Color Shifts  |                  |               |                                                                                                                                                                                                                                                                                                                                                                          |
| chroma spread | chroma_spread    | 0             | <p>Moves chroma spread to and from the center of the flare. Positive values shift red outward and blue inward, and vice versa.</p> <p><b>Note:</b> You can use the color <b>inner</b> and <b>outerfalloff</b> controls to compensate for banding created by large <b>chroma spread</b> values.</p>                                                                       |

| Control (UI) | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                          |
|--------------|------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| chroma shift | chroma_shift           | 0             | Moves color components in the direction specified in the <b>angle</b> control.                                                                                                                                                                                                                                    |
| angle        | chroma_shift_angle     | 0             | Sets the direction of <b>chroma shift</b> . Positive values rotate the shift counter-clockwise and vice versa.                                                                                                                                                                                                    |
| rel          | chroma_shift_angle_add | disabled      | When enabled, <b>angle</b> is relative to the light angle (the angle between <b>position</b> and the center point of the image).                                                                                                                                                                                  |
| Visibility   |                        |               |                                                                                                                                                                                                                                                                                                                   |
| brightness   | brightness             | 1             | Adjusts the overall brightness of the flare.<br><br>Setting this value to 0 makes the flare invisible.                                                                                                                                                                                                            |
| in           | vis_in                 | 1             | Sets the relative distance from the light source to the matte, at which the flare is fully visible.                                                                                                                                                                                                               |
| out          | vis_out                | 1.1           | Sets the relative distance from the light source to the matte, at which the flare is fully invisible.                                                                                                                                                                                                             |
| mask         | N/A                    | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                     |
|              | vis_mask               | none          | The channel to use as a visibility mask. The lens flare effect is limited to the non-black areas of this channel.<br><br>Where the visibility mask is white, the full <b>brightness</b> value is used. Where the mask is black, <b>brightness</b> is set to 0 (invisible). Gray areas are attenuated accordingly. |
| mask blur    | vis_mask_size          | 4             | When a visibility mask is used, the mask is blurred by this radius.                                                                                                                                                                                                                                               |
| Shape        |                        |               |                                                                                                                                                                                                                                                                                                                   |
| corners      | corners                | 5             | If <b>edge flattening</b> is set to a value greater than 0, this controls the number of sides that make up the polygonal flare.                                                                                                                                                                                   |

| Control (UI)     | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                |
|------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| edge flattening  | flattening        | 0             | Simulates polygonal flares that some physical lens flares create. The default value of 0 creates a circular flare. Higher values push the sides toward the center of the flare, creating a star shape at values past 1. |
| corner sharpness | sharpness         | 0.5           | Adjusts the sharpness of the angles created with <b>edgeflattening</b> .                                                                                                                                                |
| angle            | corners_angle     | 0             | Sets the position of the first corner of a polygonal flare. Positive values rotate the first corner counter-clockwise and vice versa.                                                                                   |
| rel              | corners_angle_add | disabled      | When enabled, <b>angle</b> is relative to the light angle (the angle between <b>position</b> and the center point of the image).                                                                                        |
| Multi Tab        |                   |               |                                                                                                                                                                                                                         |
| Asymmetry        |                   |               |                                                                                                                                                                                                                         |
| repeat           | asym_repeat       | 1             | Sets the number of darkened sections around the circumference of the flare.                                                                                                                                             |
| multiplier       | asym_multiplier   | 1             | Sets how dark the darkened sections are. The default value of 1 creates no darkening, whereas a value of 0 sets the darkened sections to black.                                                                         |
| falloff          | asym_falloff      | 1             | Sets the falloff at the edges of the darkened sections. The higher the value, the wider the darkened sections.                                                                                                          |
| angle            | asym_angle        | 0             | Rotates the darkened sections around the center of the flare. Positive values rotate the sections counter-clockwise and vice versa.                                                                                     |
| Multiple Flares  |                   |               |                                                                                                                                                                                                                         |
| repeat           | mult_num          | 1             | Creates multiple flares with similar attributes. These are randomized according to the controls below. You can affect multiple flares by adjusting the <b>overall seed</b> or by setting seeds for individual controls. |
| overall seed     | mult_seed         | 0             | Sets the overall seed for all attributes on all repeat flares.                                                                                                                                                          |

| Control (UI)  | Knob (Scripting)     | Default Value | Function                                                                                                                                      |
|---------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|               |                      |               | This produces random attributes for each flare. Change the value to randomly vary the attributes.                                             |
| random offset | mult_offset          | 1             | Randomly varies the offsets for all repeat flares along the line from the image center to <b>position</b> .                                   |
|               | mult_offset_seed     | 48235         | Randomly varies the offsets for all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here.    |
| size          | mult_size            | 0             | Randomly varies the sizes of all repeat flares.<br><br>Positive values scale the flares down and vice versa.                                  |
|               | mult_size_seed       | 94335         | Randomly varies the sizes of all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here.       |
| hue           | mult_color           | 0             | Randomly varies the colors of all repeat flares.<br><br>Positive values move the hue towards blue and negative values toward red.             |
|               | mult_color_seed      | 77088         | Randomly varies the colors of all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here.      |
| brightness    | mult_brightness      | 0             | Randomly varies the brightness for all repeat flares.<br><br>Positive values increase the flare brightness and vice versa.                    |
|               | mult_brightness_seed | 75021         | Randomly varies the brightness for all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here. |
| visibility    | mult_visibility      | 0             | Randomly varies the visibility for all repeat flares.<br><br>Positive values increase the flare opacity and vice versa.                       |
|               | mult_visibility_seed | 68995         | Randomly varies the visibility for all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the                  |



| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                             |
|-----------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                      |               | same value here.                                                                                                                                                                                     |
| edge flattening | mult_flattening      | 0             | Randomly varies the edge flattening for all repeat flares.<br><br>Positive values push the sides toward the center of the flare. Negative values push the sides out, creating a more circular flare. |
|                 | mult_flattening_seed | 45203         | Randomly varies the edge flattening for all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here.                                                   |
| rotation        | mult_rotate          | 0             | Randomly varies the rotation for all repeat flares.<br><br>Positive values rotate the flare clockwise and vice versa.                                                                                |
|                 | mult_rotate_seed     | 49429         | Randomly varies the rotation for all repeat flares. You can tie <b>Multiple Flare</b> controls together by giving them the same value here.                                                          |
| Extra           |                      |               |                                                                                                                                                                                                      |
| speedup         | speedup              | 0             | Decreases rendering time at the expense of horizontal resolution. The default value of 0 renders at full resolution.                                                                                 |
| Presets Tab     |                      |               |                                                                                                                                                                                                      |
| Flares          |                      |               |                                                                                                                                                                                                      |
| MultiPenta      | MultiPenta           | N/A           | Creates multiple preset polygonal flares along the line from the image center to <b>position</b> .                                                                                                   |
| Rings           |                      |               |                                                                                                                                                                                                      |
| LgRainbow       | LgRainbow            | N/A           | Creates multiple rainbow colored ring flares along the line from the image center to <b>position</b> .                                                                                               |
| Glowballs       |                      |               |                                                                                                                                                                                                      |
| Bright          | Bright               | N/A           | Creates multiple preset bright flares along the line from the image center to <b>position</b> .                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                         |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------|
| Sparkles     |                  |               |                                                                                                  |
| ManyBright   | ManyBright       | N/A           | Creates multiple preset sparkle flares along the line from the image center to <b>position</b> . |
| Symmetry4    | Symmetry4        | N/A           |                                                                                                  |
| Resets       |                  |               |                                                                                                  |
| all          | all              | N/A           | Removes all preset flares and resets all Flare node controls to their defaults.                  |

# Glint

With the Glint node, you can create star-shaped rays around all the bright points in an image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the star-shaped rays.                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, the star-shaped rays are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                         |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Glint Tab      |                  |               |                                                                                                                                                                                                                  |
| channels       | channels         | all           | <p>The star-shaped rays are only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| no. of rays    | repeat           | 2             | The number of rays coming out of the bright points in your image. For example, if you want to create five-pointed stars, enter 5 here.                                                                           |
| length         | length           | 50            | Sets the length of the rays.                                                                                                                                                                                     |
| aspect ratio   | aspect           | 1             | Sets the aspect ratio of the star-shapes.                                                                                                                                                                        |
| odd ray length | oddlen           | 1             | Gives every other ray a different length and sets that length.                                                                                                                                                   |
| rotation       | rotation         | 0             | Rotates the star-shapes by degrees. Negative values produce anti-clockwise rotation.                                                                                                                             |
| from color     | from_color       | 1             | Sets the color in the beginning of the rays near the center point of the stars.                                                                                                                                  |
| to color       | to_color         | 0             | Sets the color in the end of the rays.                                                                                                                                                                           |
| steps          | steps            | 5             | Sets how many steps the rays are formed of. The more steps you use and the shorter the rays are, the smoother the rays become.                                                                                   |
| max            | max              | enabled       | <p>When enabled, the brightest image forming the rays is used.</p> <p>When disabled, the images forming the rays are added up.</p>                                                                               |
| effect only    | effect_only      | disabled      | When enabled, only outputs the effect without merging it with the original input image.                                                                                                                          |
| w              | N/A              | disabled      | Enables the associated <b>w</b> channel to the right.                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                              |
|              | w_channel        | none          | <p>The channel to use as a mask for what are considered glint sources. Highlights in the non-black areas of this channel cause the glint effect, whereas highlights in the non-white areas do not.</p> <p>This is different from the <b>mask</b> channel in that the glint effect can extend outside the matte in this channel as long as the highlights that cause the effect are inside the matte.</p> |
| tolerance    | tolerance        | 0.5           | <p>Sets the threshold for how bright the highlights in the input image need to be to cause the glint effect. Only pixels above the threshold will bloom with the effect.</p> <p>Low values produce more glint than high values.</p>                                                                                                                                                                      |
| gamma        | gamma            | 1             | Lets you perform a gamma correction on the highlights that cause glint before the glint effect is applied.                                                                                                                                                                                                                                                                                               |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                            |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                  |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                             |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the transform is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
|              |                  |               | When disabled, the effect is applied to the entire mask.            |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1. |

# Grain

The Grain node lets you add synthetic grain (rather than grain derived from actual film stock) to an image. This helps you ensure that all of the elements in your composite, including those which were digitally generated, look like they were shot on the same film stock.

The **presets** dropdown menu includes predefined types of grain, such as **Kodak 5248** and **Kodak 5218**. These are the correct size for 2K scans.

You can also adjust the Grain node's controls to match a sample piece of grain:

1. Find a sample with a rather constant background.
2. Blur the sample to remove the grain.
3. Connect the blurred sample to the Grain node's input.
4. In the Viewer, wipe between the Grain node and the original sample image, and adjust the Grain node's controls to match the grain. It helps to view and match each of the red, green, and blue channels separately.

See also [ScannedGrain](#) and [F\\_ReGrain](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                  |
|-----------------|-----------------|-------------------------------------------|
| Input           | 1               | The image sequence to receive the effect. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                      |
| seed         | seed             | 134           | <p>A different grain pattern is produced for each frame. Change this number to get a different initial pattern, for instance if you are using multiple Grain nodes.</p> <p>If you require an identical grain plate for every frame, enter <b>-frame</b> in this field.</p>                                                           |
| presets      | presets          | N/A           | <p>Choose the film stock you want to match:</p> <ul style="list-style-type: none"> <li>• Kodak 5248</li> <li>• Kodak 5279</li> <li>• Kodak FX214</li> <li>• Kodak GT5274</li> <li>• Kodak 5217</li> <li>• Kodak 5218</li> <li>• other - changes the label on the node to other. This has no effect on the effect applied.</li> </ul> |
| Size         |                  |               |                                                                                                                                                                                                                                                                                                                                      |
| red          | red_size         | 3.3           | Shrinks or enlarges the effect in the red channel.                                                                                                                                                                                                                                                                                   |
| green        | green_size       | 2.9           | Shrinks or enlarges the effect in the green channel.                                                                                                                                                                                                                                                                                 |
| blue         | blue_size        | 2.5           | Shrinks or enlarges the effect in the blue channel.                                                                                                                                                                                                                                                                                  |
| Irregularity |                  |               |                                                                                                                                                                                                                                                                                                                                      |
| red          | red_i            | 0.6           | Increases or decreases the random quality of the effect in the red channel.                                                                                                                                                                                                                                                          |
| green        | green_i          | 0.6           | Increases or decreases the random quality of the effect in the green channel.                                                                                                                                                                                                                                                        |
| blue         | blue_i           | 0.6           | Increases or decreases the random quality of the effect in the blue channel.                                                                                                                                                                                                                                                         |
| Intensity    |                  |               |                                                                                                                                                                                                                                                                                                                                      |
| red          | red_m            | 0.416         | Increases or decreases the contrast of the effect in the red                                                                                                                                                                                                                                                                         |

| Control (UI)             | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                        |
|--------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                  |               | channel against the original image.                                                                                                                                                                                                                                             |
| green                    | green_m          | 0.46          | Increases or decreases the contrast of the effect in the green channel against the original image.                                                                                                                                                                              |
| blue                     | blue_m           | 0.85          | Increases or decreases the contrast of the effect in the blue channel against the original image.                                                                                                                                                                               |
| black                    | black            | 0             | The base amount of grain to add at the black point.                                                                                                                                                                                                                             |
| minimum rgb              | minimum          | 0, 0, 0       | The minimum output rgb values. If the calculation results in pixel values lower than these, these values are used instead.                                                                                                                                                      |
| Mask                     |                  |               |                                                                                                                                                                                                                                                                                 |
| Apply only through alpha | maskgrain        | enabled       | <p>When enabled, effect is limited to the non-black areas of the image's alpha channel. This can be useful when you want to apply grain to premultiplied CG images without contaminating the background black.</p> <p>When disabled, effect is applied to the entire image.</p> |
| Invert alpha             | invert_mask      | disabled      | Inverts the use of the alpha channel, so that when <b>Apply only through alpha</b> is enabled, the effect is limited to the non-white areas of the alpha.                                                                                                                       |

# Grid

This node creates a grid of horizontal and vertical lines on top of the input image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image on which the grid is superimposed.                                                                                                                                                                                                                                                                                                                          |
|                 | mask            | <p>An optional image to use as a mask. By default, the grid is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grid Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| output       | output           | rgba          | <p>The grid is only applied to these channels.</p> <p>You can use the checkboxes on the right to select the individual channels to output.</p>                                                                                                                                                                                                                                                                                                                                                                                                              |
| premult      | premult          | none          | These channels are set to black outside the grid shape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| clip to      | cliptype         | format        | <p>Sets how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>unionbboxandformat</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersectbboxandformat</b> - restrict the output image to an intersection of the bounding box and</li> </ul> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | incoming format area.                                                                                                                                                                                                                                                |
| replace      | replace          | disabled      | When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel which you want to throw away. |
| invert       | invert           | disabled      | When enabled, inverts the grid (that is, fills in the holes in the grid and leaves holes for the lines).                                                                                                                                                             |
| opacity      | opacity          | 1             | Adjusts the grid opacity on a sliding scale, where 0 is completely transparent and 1 is completely opaque.                                                                                                                                                           |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                        |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the grid is limited to the non-black areas of this channel.                                                                                                                                                                |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that grid is limited to the non-white areas of the mask.                                                                                                                                                                     |
| number       | number           | 10            | Sets the number of grid squares on the x and y axes.                                                                                                                                                                                                                 |
| size         | size             | 1             | Sets the grid line thickness in pixels.                                                                                                                                                                                                                              |
| translate    | translate        | 0, 0          | Translates the entire grid on the x and y axes.                                                                                                                                                                                                                      |
| Color Tab    |                  |               |                                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ramp         | ramp             | none          | <p>Selects whether to create a color gradient across the grid:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't create a color gradient.</li> <li>• <b>linear</b> - the ramp changes linearly from one color into another.</li> <li>• <b>smooth0</b> - the ramp color gradually eases into the point 0 end. This means colors in the point 0 end are spread wider than colors in the point 1 end.</li> <li>• <b>smooth1</b> - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread wider than at the point 0 end.</li> <li>• <b>smooth</b> - the ramp color gradually eases into both ends. This means colors in the point 0 and point 1 ends are spread wider than colors in the center of the ramp.</li> </ul> |
| color        | color            | 1             | <p>Sets a color for the grid.</p> <p>If <b>ramp</b> is set to anything other than <b>none</b>, this is the color for the ramp at the point 1 end (by default, the top end).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| point 1      | p1               | 100, 400      | <p>Sets the position of point 1. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| color 0      | color0           | 0             | <p>Sets the color for the ramp at the point 0 end (by default, the bottom end).</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| point 0      | p0               | 100, 100      | <p>Sets the position of point 0. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

# LightWrap

LightWrap can help composite objects into a very bright background by 'wrapping' or spilling light from the background onto the foreground object. The node creates a reflection of light around the edges of your foreground object by blending in whatever is in the background.

You should apply LightWrap on your foreground element before you composite the foreground over the background with the Merge node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                      |
|-----------------|-----------------|---------------------------------------------------------------|
| Input           | A               | The foreground image.                                         |
|                 | B               | A background that will bleed light into the foreground image. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LightWrap Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Diffuse       | size             | 15            | Adjusts the spread of the reflections on the foreground element. This and <b>Intensity</b> need to be balanced out together. You may want to start by bringing <b>Diffuse</b> all the way down to better see what you are blending in from the background. Then, adjust <b>Intensity</b> before going back to the <b>Diffuse</b> slider and, if necessary, <b>Intensity</b> again until you are happy with the result. |
| Intensity     | Intensity        | 0             | Adjusts the brightness of the reflections on the foreground element. This and <b>Diffuse</b> need to be balanced out together. You may want to start by bringing <b>Diffuse</b> all the way down to better see what                                                                                                                                                                                                    |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                             |
|------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | you are blending in from the background. Then, adjust <b>Intensity</b> before going back to the <b>Diffuse</b> slider and, if necessary, <b>Intensity</b> again until you are happy with the result. |
| Generate wrap only           | onlywrap         | disabled      | When enabled, generates the LightWrap effect only, without merging it with the foreground object.                                                                                                    |
| Disable luminance based wrap | disableluma      | disabled      | When enabled, creates a uniform effect around the edges of the foreground, rather than have the effect adjust itself according to the background.                                                    |
| Enable Glow                  | enableglow       | disabled      | When enabled, extends the effect outside the foreground object's alpha, making the object seem to glow.                                                                                              |
| FGBLur                       | FGBLur           | 1             | Sets how much the foreground matte is blurred. The more blur, the more of the background is added to the foreground.                                                                                 |
| BGBLur                       | BGBLur           | 0             | Sets how much the background is blurred before it is merged with the foreground element.                                                                                                             |
| Saturation                   | saturation       | 1             | Adjusts the saturation of the LightWrap effect.                                                                                                                                                      |
| LumaTolerance                | LumaTolerance    | 0             | Adjusts the luminance values of the LightWrap effect.                                                                                                                                                |
| Highlight Merge              | highlightmerge   | plus          | Sets how the foreground object is merged with the background. The default merge operation, <b>plus</b> , adds the elements together, producing a glow effect.                                        |
| Use constant highlight       | useconstant      | disabled      | When enabled, a constant color of your choice rather than the background is used in the LightWrap effect. Select the color using the <b>Constant</b> control.                                        |
| Constant                     | color            | 1             | Sets the color to use in the LightWrap effect when <b>Use constant highlight</b> is enabled.                                                                                                         |
| CCorrect Tab                 |                  |               |                                                                                                                                                                                                      |
| white                        | white            | 1             | This color remains unchanged when you adjust <b>gamma</b> .                                                                                                                                          |

| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                           |
|--------------|-------------------|---------------|------------------------------------------------------------------------------------|
| midtone bias | gray              | 0.18          | Sets the center of midtones, remaining unchanged when you adjust <b>contrast</b> . |
| master       |                   |               |                                                                                    |
| contrast     | contrast          | 1             | Adjusts the contrast in the entire LightWrap effect.                               |
| gamma        | gamma             | 1             | Adjusts the gamma in the entire LightWrap effect.                                  |
| gain         | gain              | 1             | Adjusts the gain in the entire LightWrap effect.                                   |
| offset       | offset            | 0             | Adjusts the offset in the entire LightWrap effect.                                 |
| shadows      |                   |               |                                                                                    |
| gamma        | shadows_gamma     | 1             | Adjusts the gamma in the darkest parts of the LightWrap effect.                    |
| gain         | shadows_gain      | 1             | Adjusts the gain in the darkest parts of the LightWrap effect.                     |
| offset       | shadows_offset    | 0             | Adjusts the offset in the darkest parts of the LightWrap effect.                   |
| midtones     |                   |               |                                                                                    |
| gamma        | midtones_gamma    | 1             | Adjusts the gamma in the middle range of the LightWrap effect.                     |
| gain         | midtones_gain     | 1             | Adjusts the gain in the middle range of the LightWrap effect.                      |
| offset       | midtones_offset   | 0             | Adjusts the offset in the middle range of the LightWrap effect.                    |
| highlights   |                   |               |                                                                                    |
| gamma        | highlights_gamma  | 1             | Adjusts the gamma in the highlights of the LightWrap effect.                       |
| gain         | highlights_gain   | 1             | Adjusts the gain in the highlights of the LightWrap effect.                        |
| offset       | highlights_offset | 0             | Adjusts the offset in the highlights of the LightWrap                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------|
|              |                  |               | effect.                                                                                   |
| mix          | mix              | 1             | Dissolves between the original LightWrap effect at 0 and the color corrected effect at 1. |

# MarkerRemoval

MarkerRemoval uses roto shapes to mask an area of the footage that you don't want to appear in the final result, typically small areas like tracking markers. Nuke automatically paints the masked area with suitable pixels sampled from the background plate.



**Note:** Painted pixels with values of 0.5 mean the algorithm was unable to locate any pixel to fill in.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                 |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The node supplying the mask information, for example <a href="#">Roto</a> or <a href="#">RotoPaint</a> . |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                               |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MarkerRemoval Tab |                  |               |                                                                                                                                                                                                                                                                                                        |
| paint type        | mode             | bilinear      | Sets the paint mode used to fill the roto shape(s): <ul style="list-style-type: none"> <li>• <b>bilinear</b> - extrapolates pixels on the xy axes to fill the roto shape(s).</li> <li>• <b>radial</b> - extrapolates pixels radially outward from a center point to fill the roto shape(s).</li> </ul> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                  |               |  <b>Note:</b> The center point is averaged between the number of roto shapes, so <b>radial</b> painting with more than one roto shape is not recommended. When using the <b>radial</b> mode, you should only use one roto shape for each MarkerRemoval node.                                                                                                         |
| bilinear y search | linearsearch     | 100           | <p>Sets the height (in pixels) used to search for suitable pixels to fill the roto shape.</p> <p>This value should always be higher than the height of the roto mask surrounding the area you want to fill, and should only be increased for large mask areas.</p>  <b>Note:</b> This option is only available when the <b>painttype</b> is set to <b>bilinear</b> . |
| control channel   |                  | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> , effectively disabling the node.                                                                                                                                                                                                                                                                                              |
|                   | ctrlMask         | rgba.alpha    | The channel that contains the roto mask(s).                                                                                                                                                                                                                                                                                                                                                                                                           |
| Pixel offset      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| x offset          | x_offset         | 0             | If the roto shape mask you intend to use is close to the <b>left</b> or <b>right</b> edges of the plate, you can offset the sample area by a specified number of pixels to create a more accurate fill for the roto shape.                                                                                                                                                                                                                            |
| y offset          | y_offset         | 0             | If the roto shape mask you intend to use is close to the <b>top</b> or <b>bottom</b> edges of the plate, you can offset the sample area by a specified number of pixels to create a more accurate fill for the roto shape.                                                                                                                                                                                                                            |

# Noise

Adds various types of seemingly random noise to the input image, all based on the Perlin noise function.

See also [Grain](#), [ScannedGrain](#), and [F\\_ReGrain](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which noise is added.                                                                                                                                                                                                                                                                                                                            |
|                 | mask            | <p>An optional image to use as a mask. By default, the noise is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise Tab    |                  |               |                                                                                                                                                                                                                                                                                                        |
| output       | output           | rgba          | <p>The noise is rendered into these output channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                            |
| premult      | premult          | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the noise. For example, where there is no noise (the matte is black or empty), the input channels are set to black. Where the noise is opaque (the matte is white or full), the input channels keep their full value.</p> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> Selecting <b>rgba</b> premultiplies the alpha against itself ( $a*a$ ). If you don't want this to happen, set <b>premult</b> to <b>rgb</b> instead.                                                                                                                                                                                                                                                                                                                                  |
| clip to      | cliptype         | format        | <p>Select how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>unionbboxandformat</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersectbboxandformat</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul> |
| replace      | replace          | disabled      | When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel which you want to throw away.                                                                                                                                                                                                                                                                                                                |
| invert       | invert           | disabled      | When enabled, inverts the new noise and non-noise areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| opacity      | opacity          | 1             | Sets the noise opacity where 0 is equal to transparent, and 1 is equal to opaque.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the noise is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                       |
| invert                | invert_mask      | disabled      | Inverts the use of the mask channel so that the noise is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                  |
| type                  | type             | fBm           | Choose the type of noise to use: <ul style="list-style-type: none"> <li>• <b>fBm</b> (fractional Brownian motion) - runs noise() octave times at different scales to get random numbers between -1 and +1 and adds them up.</li> <li>• <b>turbulence</b> - similar to <b>fBm</b> except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1.</li> </ul> |
| x/y size              | size             | 350           | Sets the lowest possible noise frequency on the x and y axes. For example, low y values relative to x produces horizontal noise.                                                                                                                                                                                                                                                                      |
| z                     | zoffset          | 0             | Offsets the noise to create new patterns. This control must be animated to produce noise changes over time. For example, the expression <i>frame/10</i> causes the noise to change completely over 10 frames.                                                                                                                                                                                         |
| octaves               | octaves          | 10            | Sets the number of Perlin noise functions to add to the noise frequency.                                                                                                                                                                                                                                                                                                                              |
| clip at Nyquist limit | nyquist          | enabled       | When enabled, limits the number of octaves so that the highest frequency is larger than one pixel. <div>  <b>Note:</b> You may need to disable this control if you're animating the size of the noise, as changes can be visible. </div>                                                                           |
| lacunarity            | lacunarity       | 2             | Sets the amount by which octaves multiply noise frequency. Lower values produce smoother noise and higher values produce more granular noise.                                                                                                                                                                                                                                                         |
| gain                  | gain             | 0.5           | Sets the amount by which octaves multiply noise                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | amplitude.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| gamma         | gamma            | 0.5           | Sets the gamma output for the noise.                                                                                                                                                                                                                                                                                                                                                                                          |
| Transform Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| translate xy  | translate        | 0, 0          | Translates the noise along the x and y axes. You can also adjust translate values by dragging the transform handle in the Viewer.                                                                                                                                                                                                                                                                                             |
| rotate        | rotate           | 0, 0          | Rotates the noise around the <b>center x y</b> coordinates. You can adjust rotate values by dragging the transform handle in the Viewer.                                                                                                                                                                                                                                                                                      |
| scale         | scaling          | 1             | Scales the noise width and height around the <b>center x y</b> coordinates.                                                                                                                                                                                                                                                                                                                                                   |
| skew          | skew             | 0             | Skews the noise on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                                          |
| center xy     | center           | N/A           | Sets the center of rotation and scale on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                    |
| xrotate       | xrotate          | 30            | Rotation around the x axis in 3D noise space. Setting this to zero reveals artifacts in the Perlin noise generator.                                                                                                                                                                                                                                                                                                           |
| yrotate       | yrotate          | 30            | Rotation around the y axis in 3D noise space. Setting this to zero reveals artifacts in the Perlin noise generator.                                                                                                                                                                                                                                                                                                           |
| Color Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| ramp          | ramp             | none          | <p>Selects whether to create a color gradient across the noise:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't create a color gradient.</li> <li>• <b>linear</b> - the ramp changes linearly from one color into another.</li> <li>• <b>smooth0</b> - the ramp color gradually eases into the point 0 end. This means colors in the point 0 end are spread wider than colors in the point 1 end.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>smooth1</b> - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread wider than colors in the point 0 end.</li> <li>• <b>smooth</b> - the ramp color gradually eases into both ends. This means colors in the point 0 and point 1 ends are spread wider than colors in the center of the ramp.</li> </ul> |
| color        | color            | 1             | <p>Sets a color for the noise.</p> <p>If <b>ramp</b> is set to anything other than <b>none</b>, this is the color for the ramp at the point 1 end (by default, the top end).</p>                                                                                                                                                                                                          |
| point 1      | p1               | 100, 400      | <p>Sets the position of point 1. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                          |
| color 0      | color0           | 0             | <p>Sets the color for the ramp at the point 0 end (by default, the bottom end).</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                                       |
| point 0      | p0               | 100, 100      | <p>Sets the position of point 0. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                          |

# Radial

Generates a radial gradation ramp.

See also [Ramp](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which the effect is added.                                                                                                                                                                                                                                                                                                                        |
|                 | mask            | <p>An optional image to use as a mask. By default, the effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radial Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| output       | output           | rgba          | <p>The effect is rendered into these output channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| premult      | premult          | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the radial ramp. For example, where there is no radial ramp (the matte is black or empty), the input channels are set to black. Where the radial ramp is opaque (the matte is white or full), the input channels keep their full value.</p> <div>  <p><b>Note:</b> Selecting <b>rgba</b> premultiplies the alpha against itself (<math>a*a</math>). If you don't want this to happen, set <b>premult</b> to <b>rgb</b> instead.</p> </div> |
| clip to      | cliptype         | format        | <p>Select how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>unionbboxandformat</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersectbboxandformat</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul> |
| replace          | replace          | disabled      | When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel which you want to throw away.                                                                                                                                                                                                              |
| invert           | invert           | disabled      | When enabled, inverts the radial ramp and non-radial ramp areas.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| opacity          | opacity          | 1             | Sets the radial ramp opacity. 0 is equal to transparent and 1 is equal to opaque.                                                                                                                                                                                                                                                                                                                                                                                                 |
| mask             | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                     |
|                  | maskChannelInput | none          | The channel to use as a mask. By default, the ramp is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                             |
| inject           | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                      |
| invert           | invert_mask      | disabled      | Inverts the use of the mask channel so that the radial ramp is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                        |
| area xyrt (xywh) | area             | N/A           | Sets the area in which the radial ramp is contained. The center of the <b>area</b> control is the originating point                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | for the radial ramp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| softness            | softness         | 1             | Sets the softness of the radial ramp edges, where 0 is a hard edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| perceptually linear | plinear          | disabled      | When enabled, the radial ramp appears more linear to the naked eye.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Color Tab           |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ramp                | ramp             | none          | <p>Selects whether to create a color gradient across the radial ramp:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't create a color gradient.</li> <li>• <b>linear</b> - the ramp changes linearly from one color into another.</li> <li>• <b>smooth0</b> - the ramp color gradually eases into the point 0 end. This means colors in the point 0 end are spread wider than colors in the point 1 end.</li> <li>• <b>smooth1</b> - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread wider than colors in the point 0 end.</li> <li>• <b>smooth</b> - the ramp color gradually eases into both ends. This means colors in the point 0 and point 1 ends are spread wider than colors in the center of the ramp.</li> </ul> |
| color               | color            | 1             | <p>Sets a color for the ramp.</p> <p>If <b>ramp</b> is set to anything other than <b>none</b>, this is the color for the ramp at the point 1 end (by default, the top end).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| point 1 xy          | p1               | 100, 400      | <p>Sets the position of point 1. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| color 0             | color0           | 0             | Sets the color for the ramp at the point 0 end (by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                   |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | default, the bottom end).<br><br>This control is only available if <b>ramp</b> is set to anything other than <b>none</b> .                                                                 |
| point 0 xy   | p0               | 100, 100      | Sets the position of point 0. This allows you to adjust the spread and angle of the ramp.<br><br>This control is only available if <b>ramp</b> is set to anything other than <b>none</b> . |

# Ramp

Generates a gradation between two defined edges. This node is included for backward compatibility - other Draw nodes, such as Rectangle, have their own Ramp controls.

See also [Radial](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which the ramp is added.                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | An optional image to use as a mask. By default, the ramp is limited to the non-black areas of the mask.<br><br>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b> . |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ramp Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| output       | output           | rgba          | <p>The ramp is rendered into these output channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                          |
| premult      | premult          | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the ramp. For example, where there is no ramp (the matte is black or empty), the input channels are set to black. Where the ramp is opaque (the matte is white or full), the input channels keep their full value.</p> <div>  <p><b>Note:</b> Selecting <b>rgba</b> premultiplies the alpha against itself (<math>a*a</math>). If you don't want this to happen, set <b>premult</b> to <b>rgb</b> instead.</p> </div> |
| clip to      | cliptype         | format        | <p>Select how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>union bbox+format</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersect bbox+format</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul>   |
| replace      | replace          | disabled      | <p>When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an</p>                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | alpha channel which you want to throw away.                                                                                                                                                                                                                                                                |
| invert       | invert           | disabled      | When enabled, inverts the new ramp and non-ramp areas.                                                                                                                                                                                                                                                     |
| opacity      | opacity          | 1             | Sets the ramp opacity where 0 is equal to transparent, and 1 is equal to opaque.                                                                                                                                                                                                                           |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                              |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the ramp is limited to the non-black areas of this channel.                                                                                                                                                                                                      |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                               |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the ramp is limited to the non-white areas of the mask.                                                                                                                                                                                                        |
| point 0 xy   | p0               | 100, 100      | <p>Sets the position of point 0. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                           |
| point 1 xy   | p1               | 100, 400      | <p>Sets the position of point 1. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                                           |
| type         | type             | linear        | <p>Sets the type of ramp to apply:</p> <ul style="list-style-type: none"> <li>• <b>linear</b> - the ramp has a linear gradient.</li> <li>• <b>plinear</b> - the ramp appears to have more linear gradient to the naked eye.</li> <li>• <b>smooth0</b> - the ramp gradually eases into the point</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                        |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | 0 end.<br>• <b>smooth1</b> - the ramp eases into the point 1 end.<br>• <b>smooth</b> - the ramp gradually eases into both ends. |
| Color Tab    |                  |               |                                                                                                                                 |
| color        | color            | 1             | Sets a color for the ramp.                                                                                                      |

# Rectangle

Generates a rectangle in a solid color on top of the input image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which the rectangle is added.                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | An optional image to use as a mask. By default, the rectangle is limited to the non-black areas of the mask.<br><br>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b> . |

| Control (UI)  | Knob (Scripting) | Default Value | Function |
|---------------|------------------|---------------|----------|
| Rectangle Tab |                  |               |          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| output       | output           | rgba          | <p>The rectangle is rendered into these output channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                    |
| premult      | premult          | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the rectangle. For example, where there is no rectangle (the matte is black or empty), the input channels are set to black. Where the rectangle is opaque (the matte is white or full), the input channels keep their full value.</p> <div>  <p><b>Note:</b> Selecting <b>rgba</b> premultiplies the alpha against itself (<math>a*a</math>). If you don't want this to happen, set <b>premult</b> to <b>rgb</b> instead.</p> </div> |
| clip to      | cliptype         | format        | <p>Select how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>unionbboxandformat</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersectbboxandformat</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul>                |
| replace      | replace          | disabled      | <p>When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel which you want to throw away.</p>                                                                                                                                                                                                                                                                                                                        |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| invert           | invert           | disabled      | When enabled, inverts the new rectangle and non-rectangle areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| opacity          | opacity          | 1             | Sets the rectangle opacity where 0 is equal to transparent, and 1 is equal to opaque.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mask             | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                  | maskChannelInput | none          | The channel to use as a mask. By default, the rectangle is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| inject           | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                             |
| invert           | invert_mask      | disabled      | Inverts the use of the mask channel so that the rectangle is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| area xyrt (xywh) | area             | N/A           | Sets the area of the rectangle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| softness         | softness         | 1             | Sets the softness of the rectangle edges where 0 is a hard edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Color Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| ramp             | ramp             | none          | <p>Selects whether to create a color gradient across the rectangle:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't create a color gradient.</li> <li>• <b>linear</b> - the ramp changes linearly from one color into another.</li> <li>• <b>smooth0</b> - the ramp color gradually eases into the point 0 end. This means colors in the point 0 end are spread wider than colors in the point 1 end.</li> <li>• <b>smooth1</b> - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>wider than colors in the point 0 end.</p> <ul style="list-style-type: none"> <li>• <b>smooth</b> - the ramp color gradually eases into both ends. This means colors in the point 0 and point 1 ends are spread wider than colors in the center of the ramp.</li> </ul> |
| color        | color            | 1             | <p>Sets a color for the ramp.</p> <p>If <b>ramp</b> is set to anything other than <b>none</b>, this is the color for the ramp at the point 1 end (by default, the top end).</p>                                                                                           |
| point 1 xy   | p1               | 100, 400      | <p>Sets the position of point 1. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                          |
| color 0      | color0           | 0             | <p>Sets the color for the ramp at the point 0 end (by default, the bottom end).</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                                       |
| point 0 xy   | p0               | 100, 100      | <p>Sets the position of point 0. This allows you to adjust the spread and angle of the ramp.</p> <p>This control is only available if <b>ramp</b> is set to anything other than <b>none</b>.</p>                                                                          |

# Roto

The Roto node is an optimal choice if you're doing rotoscoping only - it allows you to create and edit Bezier and B-spline shapes.

The toolbar on the left side of the Viewer includes point selection and manipulation, and shape creation tools. Click and hold or right-click on a toolbar button to open a sub-menu to select any of its available tool types. Options related to the current tool appear in a toolbar along the top of the Viewer. Click on a toolbar item to cycle through the available options for that class of tools.

As a general workflow guide:

1. Select your tool from the left-hand Viewer tool bar.
  2. Use the Roto tool settings above the Viewer to adjust the tool's properties.
  3. Draw your shape or shapes:
    - Click in the Viewer to place points. You can drag while clicking to pull out Bezier handles or adjust B-Spline tension.
    - **Ctrl/Cmd**+drag to sketch the shape freely.
    - To close the shape, click the first point or press **Return**. To leave the shape open, press **Esc**.
    - **Ctrl/Cmd+Alt**+click to add points to an existing shape.
    - To increase the smoothness of a point, select the point and press **Z**.
    - To cusp a point, select the point and press **Shift+Z**.
    - To delete a point, select the point and press **Delete**.
    - Beziers: **Shift**+drag on a tangent handle to snap the opposite handle to the same length.  
**Ctrl/Cmd**+drag on a tangent handle to move it independently of its opposite handle.
    - B-Splines: **Ctrl/Cmd+Alt**+drag on a point to adjust its tension.
  4. Select a shape using the **Select** tools or the shape list in the control panel.
  5. Use the control panel to adjust or fine-tune your shape(s).
- You can also create this node by pressing **O** on the Node Graph.

See also [RotoPaint](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
| Input           | bg              | Background input - adding a background automatically creates another <b>bg</b> input, allowing you to connect up to four images. |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | mask            | <p>An optional image to use as a mask. By default, the roto shapes are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Roto Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| output       | output           | alpha         | <p>The roto shapes are rendered into these output channels. The output channels are the same for all shapes created using this node - you cannot create a subset of shapes and output them to a different channel.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                      |
| premultiply  | premultiply      | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the roto shapes. For example, where there are no roto shapes (the matte is black or empty), the input channels are set to black. Where the roto shapes are opaque (the matte is white or full), the input channels keep their full value.</p> <div>  <p><b>Note:</b> Selecting rgba premultiplies the alpha against itself (a*a). If you don't want this to happen, set <b>premultiply</b> to <b>rgb</b> instead.</p> </div> |
| clip to      | cliptype         | format        | Select how to restrict the output image:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>union bbox+format</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersect bbox+format</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul> |
| replace         | replace          | disabled      | When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel which you want to throw away.                                                                                                                                                                                                                                                              |
| format dropdown |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| format          | format           | root.format   | <p>This is used if Roto has no input connected. It is the format which the node should output in the absence of any available input format. If an input is connected, this control has no effect.</p> <p>If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the image to the format indicated on the <b>Project Settings</b> dialog box.</p>                                                                                       |
| mask            | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                     |
|                 | maskChannelInput | none          | The channel to use as a mask. By default, the roto shapes are limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that output is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| output mask  |                  | disabled      | Enables the associated output mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|              | outputMask       | none          | Output mask channel. This is a channel where Roto will output a mask for what it rendered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| opacity      | opacity          | 1             | The opacity of a new or existing roto shape in the shape list. 1 is equal to totally opaque, and 0 is equal to transparent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| feather      | feather          | 0             | Softens the edges of a roto shape by fading it from more transparent to less transparent.<br><br>With positive feather values, your feather effect is outward. If your feather values are negative, the feather effect is inward.<br><br>You can also add feathering to individual points by <b>Ctrl/Cmd</b> +dragging a point in the Viewer. Press <b>E</b> to increase the feathering of selected points, or <b>Shift+E</b> to remove the feathering.<br><br>If you check <b>feather link</b> in the Roto tool settings above the Viewer, you can move the shape point and the feather point together. Otherwise, they move independently. You can also <b>Ctrl/Cmd</b> +drag a shape |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | point to temporarily disable <b>feather link</b> and move the points independently.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| on              | feather_on       | enabled       | <p>When enabled, feathering is applied to the selected shape(s).</p> <p>Disabling this is the same as setting <b>feather</b> to 0.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| feather falloff | feather_falloff  | 1             | Sets the rate of opacity falloff at a feathered edge for a shape, in pixels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| [feather type]  | feather_type     | linear        | <p>Controls the center point of the feather falloff:</p> <ul style="list-style-type: none"> <li>• <b>linear</b> - the falloff changes linearly from the shape edge to the feather edge.</li> <li>• <b>smooth0</b> - the center point of the feather falloff lies closer to the shape edge than the feather edge.</li> <li>• <b>smooth1</b> - the center point of the feather falloff lies closer to the feather edge than the shape edge.</li> <li>• <b>smooth</b> - the center point of the feather falloff lies halfway between the shape edge and the feather edge.</li> </ul> <p>These options may be helpful, for example, in matching the soft edge to motion blurred image content.</p> |
| spline key      | key              | 0             | <p>Quick access to spline keyframes:</p> <ul style="list-style-type: none"> <li>• <b>Numeric fields</b> - show whether the spline is keyed at this frame, which key you're viewing, and the total number of spline keys.</li> <li>•   - move to the previous or next spline key.</li> </ul>                                                                                                                                                                                                                              |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <ul style="list-style-type: none"> <li>  - set or delete spline keys.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| visible              | visible          | enabled       | Sets whether the selected shape or group is visible and rendered or not. You can still edit an invisible shape and view its position in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| locked               | locked           | disabled      | Locks the selected shape or group to prevent it from being edited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| view                 | view             | N/A           | The view(s) in which you want to draw your shape(s). This is only displayed if you have set up more than one view in your Project Settings (typically, if you're working on a stereoscopic project).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| stereo offset<br>x,y | stereo_offset    | 0             | <p>Moves the selected shape or group on the x and y axes. This is an extra transform that is applied after all other transforms. Typically, you would position the shape or group correctly in the hero view, then split this control, and drag the shape to its correct location in any other views. Note that you can also press <b>Shift</b> while dragging to constrain the movement to x or y axis only.</p> <p><b>Stereo offset</b> can be useful, for example, if you have a shape or group that is correctly positioned in one view and you want to move it to its correct location in another view, but can't use the <b>translate</b> control on the <b>Transform</b> tab because that's being driven by Tracker data.</p> <p>This control is only displayed if you have set up more than one view in your Project Settings (typically, if you're working on a stereoscopic project).</p> |
| shape list           | curves           | N/A           | Shows the hierarchy of shapes and groups, allowing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>you to adjust them and how they're displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Name</b> - double-click to edit the shape or group Name.</li> <li>•  - whether the shape or group is visible and rendered or not.</li> <li>•  - lock or unlock the shape or group.</li> <li>•  - set the shape outline color to appear in the Viewer.</li> <li>•  - set the color in which you want to render your shape.</li> <li>•  - invert the shape or group.</li> <li>•  - set the shape or group blending mode.</li> <li>•  - whether motion blur is applied to the shape.</li> </ul> <div style="border: 1px solid orange; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> You can only apply motion blur to shapes, not groups of shapes.</p> </div> <ul style="list-style-type: none"> <li>• <b>View</b> - displays the view(s) the shape appears in. This is only displayed if you have set up more than one view in your Project Settings (typically, if you're working on a stereoscopic project).</li> <li>• <b>Lifetime</b> - the range of frames during which the shape is visible.</li> <li>• <b>Source</b> - the shape source (as set on the <b>Shape</b> tab).</li> </ul> <p>Use the shape list to:</p> <ul style="list-style-type: none"> <li>• Select multiple items to adjust attributes on all the selected list items.</li> <li>• Drag and drop to re-order or move items between</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                          |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>groups.</p> <ul style="list-style-type: none"> <li>• Right-click for a context menu containing <b>Add new layer</b> and shape editing functions such as <b>Copy</b> and <b>Paste</b>.</li> </ul>               |
| Transform Tab |                  |               |                                                                                                                                                                                                                   |
| translate x,y | translate        | 0             | <p>Moves the selected shape or group on the x and y axes.</p> <p>You can also adjust <b>translate</b> values by dragging the transform handle in the Viewer.</p>                                                  |
| rotate        | rotate           | 0             | <p>Spins the selected shape or group around a pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>rotate</b> values by dragging the transform handle in the Viewer.</p> |
| scale         | scale            | 1             | <p>Resizes the selected shape or group on the x and y</p>                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                     |
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|              |                  |               | <p>axes.</p> <p>You can also adjust <b>scale</b> values by dragging the transform handle in the Viewer.</p>                                                                                                                                                                                  |
| skew X       | skewX            | 0             | <p>Skews the selected shape or group along the X axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>skew</b> values by dragging the transform handle in the Viewer.</p>                                                             |
| skew Y       | skewY            |               | <p>Skews the selected shape or group along the Y axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>skew</b> values by dragging the transform handle in the Viewer.</p>                                                             |
| skew order   | skew_order       | XY            | <p>Sets the order in which <b>skew X</b> and <b>skew Y</b> are applied:</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - <b>Skew X</b> is applied before <b>skew Y</b>.</li> <li>• <b>YX</b> - <b>Skew Y</b> is applied before <b>skew X</b>.</li> </ul>                             |
| center x,y   | center           | 1024, 778     | <p>Adjusts the center of rotation and skew on the x and y axes. This control does not translate roto shapes.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle in the Viewer.</p>                                                   |
| extra matrix | transform_matrix | N/A           | <p>Adds an extra matrix which is calculated after the transforms defined by the other controls. This can be useful, for example, if you are using a 3rd party application, such as a tracker, and your tracking data cannot be fully represented using the available transform controls.</p> |
| shape list   | curves           | N/A           | <p>See the <b>Roto</b> tab for the shape list controls.</p>                                                                                                                                                                                                                                  |

| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Motion Blur Tab |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| shape           | global_motionblur_on | enabled       | <p>When enabled, motion blur is applied to shapes selected in the shape list or Viewer.</p> <p><b>shape</b> motion blur determines the exposure for each moving shape and blends the resulting blurred shapes. This may be more efficient than the <b>global</b> motion blur since each shape will only be blended once.</p> <div> <b>Note:</b> Shape motion blur may result in artifacts when shapes blur over the same region.</div>                                                                                                                                                                                                                                                                            |
| global          |                      | disabled      | <p>When enabled, motion blur is applied to all shapes in the current Roto node.</p> <div> <b>Note:</b> Global motion blur overrides the per-shape motion blur settings.</div> <p><b>global</b> motion blur correctly accounts for interaction between motion blurred shapes. This may be more expensive than the <b>shape</b> motion blur since it may blend each shape for every sample.</p> <div> <b>Note:</b> Global motion blur requires that shutter and sampling parameters are the same for all shapes and has been optimized for consecutive shapes with the same properties using the <b>over</b> blend mode.</div> |
| Shape Blur      |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



| Control (UI)   | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|--------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| motionblur     | motionblur                     | 1             | Sets the number of motion blur samples for the selected shape(s). Increase this for better quality but slower rendering, decrease it for faster rendering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| on             | motionblur_on                  | disabled      | When enabled, motion blur is applied to the selected shape(s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| shutter        | motionblur_shutter             | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces higher quality motion blur, but increases render time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| shutter offset | motionblur_shutter_offset_type | start         | Controls how the shutter behaves with respect to the current frame value. There are four options: <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
| [offset]       | motionblur_shutter_offset      | 0             | If the shutter offset control is set to <b>custom</b> , this control is used to set the time that the shutter opens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)   | Knob (Scripting)                      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|---------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                       |               | <p>by adding it to the current frame.</p> <p>Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Global Blur    |                                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| motionblur     | global_motionblur                     | 1             | Sets the number of motion blur samples for all shapes in the current Roto node. Increase this for better quality but slower rendering, decrease it for faster rendering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| shutter        | global_motionblur_shutter             | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces higher quality motion blur, but increases render time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| shutter offset | global_motionblur_shutter_offset_type | start         | <p>Controls how the shutter behaves with respect to the current frame value. There are four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before</li> </ul> |

| Control (UI)  | Knob (Scripting)                 | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|----------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                  |               | the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| [offset]      | global_motionblur_shutter_offset | 0             | <p>If the shutter offset control is set to <b>custom</b>, this control is used to set the time that the shutter opens by adding it to the current frame.</p> <p>Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| shape list    | curves                           | N/A           | See the <b>Roto</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Shape Tab     |                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| source        | shape_source                     | color         | <p>Sets the color or source input for the selected shape:</p> <ul style="list-style-type: none"> <li>• <b>color</b> - the color specified in the <b>color</b> field.</li> <li>• <b>foreground</b> - pulls pixels from the bg input, including any shapes drawn on it. This input is mainly used with the Clone tab controls. Using it may cause slower renders.</li> <li>• <b>background</b> - pulls pixels from the bg input, not including any shapes drawn on it.</li> <li>• <b>backgrounds 1 to 3</b> - pulls pixels from <b>bg1</b>, <b>bg2</b>, and <b>bg3</b> inputs.</li> </ul>                                                                                               |
| blending mode | blending_mode                    | over          | <p>Sets how the colors in the current shape (A) are merged with the underlying image and shapes (B):</p> <ul style="list-style-type: none"> <li>• <b>color-burn</b> (darken B towards A) - darkens B to reflect A by increasing the contrast. No part of the image becomes lighter.</li> <li>• <b>color-dodge</b> (brighten B towards A) - brightens B to reflect A by decreasing the contrast. No part of the image is darkened.</li> <li>• <b>difference</b> (abs(A-B)) - subtracts either B from A or vice versa, depending on which is brighter. Blending with white inverts A, while blending with black produces no change. Similar colors will return black pixels.</li> </ul> |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | <ul style="list-style-type: none"> <li>• <b>exclusion</b> (<math>A+B-2AB</math>) - creates a result similar to the <b>difference</b> mode but lower in contrast. Like with <b>difference</b>, blending with white inverts A. Blending with black produces no change.</li> <li>• <b>from</b> (<math>B-A</math>) - subtracts A from B.</li> <li>• <b>hard-light</b> (multiply if <math>A &lt; .5</math>, screen if <math>A &gt; .5</math>) - lightens highlights and darkens shadows. If B is lighter than 50% gray, the result lightens as if it were screened. If B is darker than 50% gray, the result is darkened as if it were multiplied.</li> <li>• <b>max</b> (<math>\max(A,B)</math>) - selects the lighter of the two colors as the resulting color. Only areas darker than B are replaced, while areas lighter than B do not change.</li> <li>• <b>min</b> (<math>\min(A,B)</math>) - selects the darker of the two colors as the resulting color. Any parts that are lighter than B are substituted. Any parts of the image that are darker than B don't change.</li> </ul> |
| blending mode<br>(continued) |                  |               | <ul style="list-style-type: none"> <li>• <b>minus</b> (<math>A-B</math>) - subtracts B from A.</li> <li>• <b>multiply</b> (<math>AB</math>, A if <math>A &lt; 0</math> and <math>B &lt; 0</math>) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged.</li> <li>• <b>over</b> (A over B) - the colors of the two images will not interact in any way, and Nuke will display the full value of the colors in A.</li> <li>• <b>overlay</b> (multiply if <math>B &lt; .5</math>, screen if <math>B &gt; .5</math>) - depending on A, multiplies or screens the colors. B brightens A while preserving highlights and shadows.</li> <li>• <b>plus</b> (<math>A+B</math>) - the sum of the two colors. Increases brightness to lighten A and reflect B. Plus is similar to the <b>screen</b> blending mode, but produces a more extreme result.</li> </ul>                                                                                                                                                        |

| Control (UI)  | Knob (Scripting)          | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|---------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                           |               | <ul style="list-style-type: none"> <li>• <b>screen</b> (<math>A+B-AB</math> if A and B between 0-1, else A if <math>A&gt;B</math> else B) - this is a soft <b>plus</b> making everything brighter but ramping off the whites. Light colors have more of an effect than dark colors. The result is always a lighter color. Blending with black leaves the pixel unchanged, blending with white always returns white. The result is similar to projecting multiple slides on top of each other.</li> <li>• <b>soft-light</b> - depending on A, darkens or lightens the colors. Less extreme than the <b>hard light</b> blending mode.</li> </ul> |
| color         | color                     | 1             | Sets the color for the roto shape. This control only has an effect when <b>source</b> is set to <b>color</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| overall width | openspline_width          | 10            | Sets the overall spline width of selected splines and all new open splines.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| start type    | openspline_start_end_type | rounded       | Sets the style of the first point for the selected spline (s) and all new open splines: <ul style="list-style-type: none"> <li>• <b>rounded</b> - the starting point of the spline has a rounded end.</li> <li>• <b>square</b> - the starting point of the spline has a square end.</li> </ul>                                                                                                                                                                                                                                                                                                                                                 |
| end type      | openspline_last_end_type  | rounded       | Sets the style of the last point for the selected spline (s) and all new open splines: <ul style="list-style-type: none"> <li>• <b>rounded</b> - the finishing point of the spline has a rounded end.</li> <li>• <b>square</b> - the finishing point of the spline has a square end.</li> </ul>                                                                                                                                                                                                                                                                                                                                                |
| invert        | inverted                  | disabled      | Swaps the colors of the currently selected shape and the underlying image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| shape list    | curves                    | N/A           | See the <b>Roto</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Clone Tab     |                           |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)   | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                            |
|----------------|----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| translate x,y  | source_transform_translate | 0,0           | <p>Moves the <b>source</b> image along the x and y axes.</p> <p>You can also adjust translate values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>                                                         |
| round to pixel | source_translate_round     | disabled      | <p>Rounds the <b>translate x,y</b> amount to the nearest whole integer pixel. This can help you avoid softening when using filtering.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>                                                                         |
| rotate         | source_transform_rotate    | 0             | <p>Spins the <b>source</b> image around the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can adjust <b>rotate</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>       |
| scale          | source_transform_scale     | 1             | <p>Resizes the <b>source</b> image on the x and y axes.</p> <p>You can adjust <b>scale</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>                                                            |
| skew X         | source_transform_skewX     | 0             | <p>Skews the source image along the X axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can adjust <b>skew</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p> |

| Control (UI) | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|-----------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew Y       | source_transform_skewY      | 0             | <p>Skews the source image along the Y axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can adjust <b>skew</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>                                                                                                                                                                                                                                              |
| skew order   | source_transform_skew_order | XY            | <p>Sets the order in which <b>skew X</b> and <b>skew Y</b> are applied:</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - <b>skew X</b> is applied before <b>skew Y</b>.</li> <li>• <b>YX</b> - <b>skew Y</b> is applied before <b>skew X</b>.</li> </ul>                                                                                                                                                                                                                                                                                                 |
| center x,y   | source_transform_center     | N/A           | <p>Adjusts the center of rotation and skew on the x and y axes. This control does not translate the <b>source</b> image.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p>                                                                                                                                                                                                         |
| filter       | source_filter               | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <div>  <b>Note:</b> If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, the <b>filter</b> dropdown is disabled. </div> |

| Control (UI)  | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|               |                      |               | <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| black outside | source_black_outside | disabled      | <p>When rotating or translating the <b>source</b> image, a part of the image area may get cropped. To fill the cropped portion with black, check <b>black outside</b>. To fill the cropped portion by expanding the edges of the image, uncheck <b>black outside</b>.</p> <div>  <b>Note:</b> If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



| Control (UI)  | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| time offset   | source_time_offset      | 0             | Allows you to clone or reveal pixels from a different frame. Time offset is either <b>relative</b> to the current frame (-1 is the frame previous to the current one) or <b>absolute</b> (1 is the first frame in the clip).                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|               | source_time_offset_type | relative      | If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| view          | source_view             | current       | Sets the view you want to clone from.<br><br>This is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| shape list    | curves                  | N/A           | See the <b>Roto</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Lifetime Tab  |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| lifetime type | lifetime_type           | single frame  | Sets the range of frames during which the currently selected shape or group is visible: <ul style="list-style-type: none"> <li>• <b>all</b> - the selection appears in all frames of the composition.</li> <li>• <b>start to frame</b> - the selection appears from the first frame to the specified <b>to</b> frame.</li> <li>• <b>single</b> - the selection appears on one frame only. You can specify the frame using the <b>from</b> field.</li> <li>• <b>to end</b> - the selection appears from the specified <b>from</b> frame to the last frame.</li> <li>• <b>range</b> - the selection appears from the specified <b>from</b> frame up to the specified <b>to</b> frame.</li> </ul> |
| from          | lifetime_start          | 1             | Sets the first frame for <b>single</b> , <b>to end</b> , and <b>range</b> lifetime types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| to            | lifetime_end            | 1             | Sets the last frame for <b>start to frame</b> and <b>range</b> lifetime types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| shape list    | curves                  | N/A           | See the <b>Roto</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)                        | Knob (Scripting)             | Default Value          | Function                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------|------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tracking Tab                        |                              |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Settings                            |                              |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| track channels                      | channels                     | rgb                    | Tracking only occurs in these channels.<br><br>You can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                                                                                     |
| pre-track filter                    | pretrack_filter              | none                   | Before image patches are compared, the selected filter is applied. You can select one of the following options: <ul style="list-style-type: none"> <li>• <b>none</b> - This disables all pre-filtering, which allows you to have full control of tuning the input image for tracking.</li> <li>• <b>adjust contrast</b> - This stretches the image contrast to better suit the tracking algorithm. This option is recommended.</li> </ul> |
| adjust for luminance changes        | adjust_for_luminance_changes | disabled               | Enabling this option performs extra pre-filtering to help compensate for changes in brightness in the image over time.                                                                                                                                                                                                                                                                                                                    |
| clamp super-white, sub-zero footage | clamp_footage                | enabled                | When enabled, the pixel values in the tracked area are clamped between 0-1.<br><br>If you want to track the full dynamic range of your footage, you should disable this control.                                                                                                                                                                                                                                                          |
| hide progress bar                   | hide_progress_bar            | disabled               | When enabled, the tracking progress bar is hidden.                                                                                                                                                                                                                                                                                                                                                                                        |
| Export                              |                              |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| export menu                         | export_menu                  | CornerPin2D (relative) | Sets the node type to export the track data: <ul style="list-style-type: none"> <li>• <b>CornerPin2D (relative)</b> - warp the image according to the relative transform between the current frame and the reference frame.</li> <li>• <b>CornerPin2D (absolute)</b> - set the to positions to the corners of the planar surface, and the from</li> </ul>                                                                                 |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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|                  |                  |               | <p>positions to the dimensions of the currently selected node. This option places the incoming image entirely inside the planar surface.</p> <ul style="list-style-type: none"><li>• <b>CornerPin2D (stabilize)</b> - applies the inverse transform of the track to stabilize the image. This option locks down the image so that the tracked plane effectively doesn't move - can be very useful for applying drift corrections.</li><li>• <b>Tracker</b> - creates a four-corner Tracker node with each of the trackers taking the positions of planar surface corners. This allows you to use the Tracker's transform functions to stabilize, reduce jitter, and so on. This export option is always baked out in order for the transform to work correctly.</li></ul> |
| create           | export_button    | N/A           | Click to create the selected node containing the track data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| link output      | link_output      | enabled       | When enabled, create a link between Roto and the exported node, so that when the track updates, the points are updated too.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Correction       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| CornerPin points |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| point1 xy        | pt1              | N/A           | The CornerPin points are populated automatically when you track an object. When you draw a roto shape and convert it into a track object, Nuke automatically places four corner pins around the shape. These are the points that are tracked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| point2 xy        | pt2              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| point3 xy        | pt3              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| point4 xy        | pt4              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Offsets          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| offset1 xy       | of1              | N/A           | You can correct the four automatically placed points by offsetting any or all of the four points. To offset a point, simply click and drag it in the Viewer to the correct position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| offset2 xy       | of2              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| offset3 xy       | of3              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)    | Knob (Scripting) | Default Value                       | Function                                                                            |
|-----------------|------------------|-------------------------------------|-------------------------------------------------------------------------------------|
| offset4 xy      | of4              |                                     |                                                                                     |
| reference frame | reference_frame  | The first frame used to track from. | The frame used as a reference to compare all other frames containing tracking data. |
| shape list      | curves           | N/A                                 | See the <b>Roto</b> tab for the shape list controls.                                |

# RotoPaint

RotoPaint is a vector-based node for help with tasks like rotoscoping, rig removal, garbage matting and dustbusting. You can draw Bezier and B-Spline shapes with individual and layer group attributes, including per-point and global feather, motion blur, blending modes and individual or hierarchical 2D transformations.

The RotoPaint node gives you a broader scale of tools to use than [Roto](#), though many of the controls are shared across both nodes. As with the Roto node, you should use the Viewer tools to create shapes and paint strokes, and then edit them using the control panel.

The toolbar on the left side of the Viewer has point selection and manipulation, and shape creation tools identical to Roto nodes. In addition, RotoPaint nodes also have brush, clone/reveal, blur, and dodge/burn tools. Click and hold or right-click on a toolbar button to open a sub-menu to select any of its available tool types. Options related to the current tool appear in a toolbar along the top of the Viewer. Click on a toolbar item to cycle through the available options for that class of tools.

As a general workflow guide:

1. Select your tool from the left-hand Viewer tool bar.
2. Use the RotoPaint tool settings above the Viewer to adjust the tool's properties.
3. When painting, you can:
  - **Shift**+drag on the Viewer to change brush size.
  - Clone tool: **Ctrl/Cmd**+click and drag to set the clone offset. To reset the clone offset, **Ctrl/Cmd**+**Shift**+click and drag.
4. When drawing your shapes, you can:
  - Click in the Viewer to place points. You can drag while clicking to pull out Bezier handles or adjust B-Spline tension.
  - **Ctrl/Cmd**+drag to sketch the shape freely.

- Click the first point or press **Return** to close the shape. To leave the shape open, press **Esc**.
  - **Ctrl/Cmd+Alt**+click to add points to an existing shape.
  - Select a point and press **Z** to increase the smoothness of the point.
  - Select the point and press **Shift+Z** to cusp the point.
  - Select the point and press **Delete** to delete a point.
  - Beziers: **Shift**+drag on a tangent handle to snap the opposite handle to the same length.  
**Ctrl/Cmd**+drag on a tangent handle to move it independently of its opposite handle.
  - B-Splines: **Ctrl/Cmd+Alt**+drag on a point to adjust its tension.
5. Select a shape or stroke using the **Select** tools or the shape/stroke list in the control panel.
  6. Use the control panel to adjust or fine-tune your shape(s) or stroke(s).
- You can also create this node by pressing **P** on the Node Graph.

See also [Roto](#), [Project3D](#), [F\\_RigRemoval](#), and [F\\_WireRemoval](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | bg              | Background input - adding a background automatically creates another <b>bg</b> input allowing you to connect up to four images.                                                                                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the roto shapes and paint strokes are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                   |
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| RotoPaint Tab |                  |               |                                                                                                                                                            |
| output        | output           | rgba          | The roto shapes and paint strokes are rendered into these output channels. The output channels are the same for all shapes and paint strokes created using |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|              |                  |               | <p>this node - you cannot create a subset of shapes or strokes and output them to a different channel.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                           |
| premultiply  | premultiply      | none          | <p>Premultiply multiplies the chosen input channels with a mask representing the roto shapes and paint strokes. For example, where there are no shapes/strokes (the matte is black or empty) the input channels will be set to black. Where the shapes/strokes are opaque (the matte is white or full) the input channels keep their full value.</p> <p>Note that selecting <b>rgba</b> premultiplies the alpha against itself (<math>a*a</math>). If you don't want this to happen, set <b>premultiply</b> to <b>rgb</b>.</p>                                                          |
| clip to      | cliptype         | format        | <p>Sets how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>union bbox and format</b> - restrict the output image to a combination of the incoming bounding box and format area.</li> <li>• <b>intersect bbox and format</b> - restrict the output image to an intersection of the bounding box and incoming format area.</li> </ul> |
| replace      | replace          | disabled      | <p>When enabled, existing channels are cleared to black before drawing into them. You might find <b>replace</b> useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an alpha channel that you want to throw</p>                                                                                                                                                                                                                                                                                                                    |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                 |                  |               | away.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| format dropdown |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| format          | format           | root.format   | <p>This is used if RotoPaint has no input connected. It is the format which the node should output in the absence of any available input format. If an input is connected, this control has no effect.</p> <p>If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the image to the format indicated on the <b>Project Settings</b> dialog box.</p> |
| mask            | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                    |
|                 | maskChannelInput | none          | The channel to use as a mask. By default, the output is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                          |
| inject          | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                     |
| invert          | invert_mask      | disabled      | Inverts the use of the mask channel, so that output is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                               |
| fringe          | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                              |
| output mask     | N/A              | disabled      | Enables the associated output mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                             |
|                 | outputMask       | none          | Output mask channel. This is a channel where                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|               |                  |               | <p>RotoPaint will output a mask for what it rendered.</p> <p>The mask can be useful, for example, if you need to apply grain to the areas you've painted, but you don't want to double up the gain in other areas.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| color         | color            | 1             | Sets the color for the roto shape or paint stroke. This control only has an effect when <b>source</b> is set to <b>color</b> on the <b>Shape</b> or <b>Stroke</b> tab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| opacity       | opacity          | 1             | Sets the opacity of a new or existing shape or stroke in the shape/stroke list. 1 is equal to totally opaque and 0 is equal to transparent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| source        | paint_source     | color         | <p>Sets the source color for the selected shape/stroke:</p> <ul style="list-style-type: none"> <li>• <b>color</b> - the color specified in the <b>color</b> field.</li> <li>• <b>foreground</b> - pulls pixels from the <b>bg</b> input, including any shapes and strokes drawn on it. This input is mainly used with the <b>Clone</b> tab controls. Using it may cause slower renders.</li> <li>• <b>background</b> - pulls pixels from the <b>bg</b> input, not including any shapes and strokes drawn on it.</li> <li>• <b>backgrounds 1 to 3</b> - pulls pixels from <b>bg1</b>, <b>bg2</b>, and <b>bg3</b> inputs.</li> </ul>                               |
| blending mode | blending_mode    | over          | <p>Sets how the colors in the current shape (A) are merged with the underlying image and shapes (B):</p> <ul style="list-style-type: none"> <li>• <b>color-burn</b> (darken B towards A) - darkens B to reflect A by increasing the contrast. No part of the image becomes lighter.</li> <li>• <b>color-dodge</b> (brighten B towards A) - brightens B to reflect A by decreasing the contrast. No part of the image is darkened.</li> <li>• <b>difference</b> (abs(A-B)) - subtracts either B from A or vice versa, depending on which is brighter. Blending with white inverts A, while blending with black produces no change. Similar colors will</li> </ul> |



| Control (UI)              | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                           |                  |               | <p>return black pixels.</p> <ul style="list-style-type: none"> <li>• <b>exclusion</b> (<math>A+B-2AB</math>) - creates a result similar to the <b>difference</b> mode but lower in contrast. Like with <b>difference</b>, blending with white inverts A. Blending with black produces no change.</li> <li>• <b>from</b> (<math>B-A</math>) - subtracts A from B.</li> <li>• <b>hard-light</b> (multiply if <math>A &lt; .5</math>, screen if <math>A &gt; .5</math>) - lightens highlights and darkens shadows. If B is lighter than 50% gray, the result lightens as if it were screened. If B is darker than 50% gray, the result is darkened as if it were multiplied.</li> <li>• <b>max</b> (<math>\max(A,B)</math>) - selects the lighter of the two colors as the resulting color. Only areas darker than B are replaced, while areas lighter than B do not change.</li> <li>• <b>min</b> (<math>\min(A,B)</math>) - selects the darker of the two colors as the resulting color. Any parts that are lighter than B are substituted. Any parts of the image that are darker than B don't change.</li> </ul> |
| blending mode (continued) |                  |               | <ul style="list-style-type: none"> <li>• <b>minus</b> (<math>A-B</math>) - subtracts B from A.</li> <li>• <b>multiply</b> (<math>AB</math>, A if <math>A &lt; 0</math> and <math>B &lt; 0</math>) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged.</li> <li>• <b>over</b> (A over B) - the colors of the two images will not interact in any way, and Nuke will display the full value of the colors in A.</li> <li>• <b>overlay</b> (multiply if <math>B &lt; .5</math>, screen if <math>B &gt; .5</math>) - depending on A, multiplies or screens the colors. B brightens A while preserving highlights and shadows.</li> <li>• <b>plus</b> (<math>A+B</math>) - the sum of the two colors. Increases brightness to lighten A and reflect B. Plus is similar to the <b>screen</b> blending mode, but produces a</li> </ul>                                                                                                                                                                                                         |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                   |                  |               | <p>more extreme result.</p> <ul style="list-style-type: none"> <li>• <b>screen</b> (<math>A+B-AB</math> if <math>A</math> and <math>B</math> between 0-1, else <math>A</math> if <math>A&gt;B</math> else <math>B</math>) - this is a soft <b>plus</b> making everything brighter but ramping off the whites. Light colors have more of an effect than dark colors. The result is always a lighter color. Blending with black leaves the pixel unchanged, blending with white always returns white. The result is similar to projecting multiple slides on top of each other.</li> <li>• <b>soft-light</b> - depending on <math>A</math>, darkens or lightens the colors. Less extreme than the <b>hard light</b> blending mode.</li> </ul> |
| view              | view             | N/A           | Sets the view(s) in which you want to draw your shape(s) or stroke(s). This is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| spline key        | key              | 0             | <p>Quick access to spline keyframes:</p> <ul style="list-style-type: none"> <li>• <b>Numeric fields</b> - show whether the spline is keyed at this frame, which key you're viewing, and the total number of spline keys.</li> <li>•   - move to the previous or next spline key.</li> <li>•   - set or delete spline keys.</li> </ul>                                                           |
| visible           | visible          | enabled       | Sets whether the selected shape, paint stroke, or group is visible and rendered or not. You can still edit an invisible shape/stroke and view its position in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| locked            | locked           | disabled      | Locks the selected shape, stroke, or group to prevent it from being edited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| stereo offset x,y | stereo_offset    | 0             | Moves the selected stroke, shape, or group on the x and y axes. This is an extra transform that is applied after all other transforms. Typically, you would                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                   |                  |               | <p>position the stroke, shape, or group correctly in the hero view, then split this control, and drag the stroke or shape to its correct location in any other views. Note that you can also press <b>Shift</b> while dragging to constrain the movement to x or y axis only.</p> <p><b>Stereo offset</b> can be useful, for example, if you have a stroke, shape, or group that is correctly positioned in one view and you want to move it to its correct location in another view, but can't use the <b>translate</b> control on the <b>Transform</b> tab because that's being driven by Tracker data.</p> <p>This control is only displayed if you have set up more than one view in your Project Settings (typically, if you're working on a stereoscopic project).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| shape/stroke list | curves           | N/A           | <p>Shows the hierarchy of shapes, paint strokes, and groups, allowing you to adjust them and how they're displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Name</b> - double-click to edit the shape, stroke, or group Name.</li> <li>•  - whether the shape, stroke, or group is visible and rendered.</li> <li>•  - lock or unlock the shape, stroke, or group.</li> <li>•  - set the shape outline color to appear in the Viewer.</li> <li>•  - set the color in which you want to render your shape/stroke.</li> <li>•  - invert the shape, stroke, or group.</li> <li>•  - set the shape, stroke, or group blending mode.</li> <li>•  - whether motion blur is applied to the shape.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>View</b> - displays the view(s) the shape/stroke appears in. This is only displayed if you have set up more than one view in your <b>Projects Settings</b> (typically, if you're working on a stereoscopic project).</li> <li>• <b>Lifetime</b> - the range of frames during which the shape/stroke is visible.</li> <li>• <b>Source</b> - the shape or stroke source (as set on the <b>Shape, Stroke, or RotoPaint</b> tab).</li> </ul> <p>Use the shape/stroke list to:</p> <ul style="list-style-type: none"> <li>• Select multiple items to adjust attributes on all the selected list items.</li> <li>• Drag and drop to re-order or move items between groups.</li> <li>• Right-click for a context menu containing <b>Add new layer</b> and shape/stroke editing functions such as <b>Copy</b> and <b>Paste</b>.</li> </ul> |
| Transform Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| translate x,y | translate        | 0             | <p>Moves the selected shape, stroke, or group on the x and y axes.</p> <p>You can also adjust <b>translate</b> values by dragging the transform handle in the Viewer.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| rotate        | rotate           | 0             | <p>Spins the selected shape, stroke, or group around the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>rotate</b> values by dragging the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | transform handle in the Viewer.                                                                                                                                                                                                                                       |
| scale        | scale            | 1             | <p>Resizes the selected shape, stroke, or group on the x and y axes.</p> <p>You can also adjust <b>scale</b> values by dragging the transform handle in the Viewer.</p>                                                                                               |
| skew X       | skewX            | 0             | <p>Skews the selected shape, stroke, or group along the X axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle in the Viewer.</p> |
| skew Y       | skewY            | 0             | <p>Skews the selected shape, stroke, or group along the Y axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle in the Viewer.</p> |
| skew order   | skew_order       | XY            | <p>Sets the order in which <b>skew X</b> and <b>skew Y</b> are applied:</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - <b>Skew X</b> is applied before <b>skew Y</b>.</li> <li>• <b>YX</b> - <b>Skew Y</b> is applied before <b>skew X</b>.</li> </ul>      |
| center x,y   | center           | 1024, 778     | <p>Adjusts the center of rotation and skew on the X and Y axes. This control does not translate shapes or strokes.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle in the Viewer.</p>                      |

| Control (UI)      | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| extra matrix      | transform_matrix     | N/A           | Adds an extra matrix which is calculated after the transforms defined by the other controls. This can be useful, for example, if you are using a 3rd party application, such as a tracker, and your tracking data cannot be fully represented using the available transform controls.                                                                                                                                                                                                                                      |
| shape/stroke list | curves               | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Motion Blur Tab   |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| shape             | global_motionblur_on | enabled       | <p>When enabled, motion blur is applied to shapes selected in the shape list or Viewer.</p> <p><b>shape</b> motion blur determines the exposure for each moving shape and blends the resulting blurred shape. This may be more efficient than the <b>global</b> motion blur since each shape will only be blended once.</p> <div>  <b>Note:</b> Shape motion blur may result in artifacts when shapes blur over the same region. </div> |
| global            |                      | disabled      | <p>When enabled, motion blur is applied to all shapes in the current RotoPaint node.</p> <div>  <b>Note:</b> Global motion blur overrides the per-shape motion blur settings. </div> <p><b>global</b> motion blur correctly accounts for interaction between motion blurred shapes. This may be more expensive than the <b>shape</b> motion blur since it may blend each shape for every sample.</p>                                    |

| Control (UI)   | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|                |                                |               |  <b>Note:</b> Global motion blur requires that shutter and sampling parameters are the same for all shapes and has been optimized for consecutive shapes with the same properties using the <b>over</b> blend mode.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Shape Blur     |                                |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| motionblur     | motionblur                     | 1             | Sets the number of motion blur samples for the selected shape(s). Increase this for better quality but slower rendering, decrease it for faster rendering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| on             | motionblur_on                  | disabled      | When enabled, motion blur is applied to the selected shape(s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter        | motionblur_shutter             | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces higher quality motion blur, but increases render time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| shutter offset | motionblur_shutter_offset_type | start         | <p>Controls how the shutter behaves with respect to the current frame value. There are four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> </ul> |

| Control (UI)   | Knob (Scripting)                      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                       |               | <ul style="list-style-type: none"> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul>                                                                                                                                                           |
| [offset]       | motionblur_shutter_offset             | 0             | <p>If the shutter offset control is set to <b>custom</b>, this control is used to set the time that the shutter opens by adding it to the current frame.</p> <p>Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                   |
| Global Blur    |                                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| motionblur     | global_motionblur                     | 1             | Sets the number of motion blur samples for all shapes in the current RotoPaint node. Increase this for better quality but slower rendering, decrease it for faster rendering.                                                                                                                                                                                                                                                                                                                                                                     |
| shutter        | global_motionblur_shutter             | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces higher quality motion blur, but increases render time.                                                                                                                                                                                                                                                                                                                              |
| shutter offset | global_motionblur_shutter_offset_type | start         | <p>Controls how the shutter behaves with respect to the current frame value. There are four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> </ul> |



| Control (UI)      | Knob (Scripting)                 | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                   |                                  |               | <ul style="list-style-type: none"> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul>                             |
| [offset]          | global_motionblur_shutter_offset | 0             | <p>If the shutter offset control is set to <b>custom</b>, this control is used to set the time that the shutter opens by adding it to the current frame.</p> <p>Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                                                                              |
| shape/stroke list | curves                           | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shape Tab         |                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| source            | shape_source                     | color         | <p>Sets the color or source input for the selected shape:</p> <ul style="list-style-type: none"> <li>• <b>color</b> - the color specified in the <b>color</b> field.</li> <li>• <b>foreground</b> - pulls pixels from the <b>bg</b> input, including any shapes drawn on it. This input is mainly used with the <b>Clone</b> tab controls. Using it may cause slower renders.</li> <li>• <b>background</b> - pulls pixels from the <b>bg</b> input, not including any shapes drawn on it.</li> <li>• <b>backgrounds 1 to 3</b> - pulls pixels from <b>bg1</b>, <b>bg2</b>, and <b>bg3</b> inputs.</li> </ul> |
| feather           | feather                          | 0             | Softens the edges of a roto shape by fading it from more transparent to less transparent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|                 |                  |               | <p>With positive feather values, your feather effect is outward. If your feather values are negative, the feather effect is inward.</p> <p>You can also add feathering to individual points by <b>Ctrl/Cmd</b>+dragging a point in the Viewer. Press <b>E</b> to increase the feathering of selected points, or <b>Shift+E</b> to remove the feathering.</p> <p>If you check <b>feather link</b> in the Roto tool settings above the Viewer, you can move the shape point and the feather point together. Otherwise, they move independently. You can also <b>Ctrl/Cmd</b>+drag a shape point to temporarily disable <b>feather link</b> and move the points independently.</p> |
| on              | feather_on       | enabled       | <p>When enabled, feathering is applied to the selected shape(s).</p> <p>Disabling this is the same as setting <b>feather</b> to 0.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| feather falloff | feather_falloff  | 1             | Sets the rate of opacity falloff at a feathered edge for a shape. This is measured in pixels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| [feather type]  | feather_type     | linear        | <p>Controls the center point of the feather falloff:</p> <ul style="list-style-type: none"> <li>• <b>linear</b> - the falloff changes linearly from the shape edge to the feather edge.</li> <li>• <b>smooth0</b> - the center point of the feather falloff lies closer to the shape edge than the feather edge.</li> <li>• <b>smooth1</b> - the center point of the feather falloff lies closer to the feather edge than the shape edge.</li> <li>• <b>smooth</b> - the center point of the feather falloff lies halfway between the shape edge and the feather edge.</li> </ul> <p>These options may be helpful, for example, in</p>                                          |

| Control (UI)      | Knob (Scripting)          | Default Value | Function                                                                                                                                                                                                                                                                                        |
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|                   |                           |               | matching the soft edge to motion blurred image content.                                                                                                                                                                                                                                         |
| overall width     | openspline_width          | 10            | Sets the overall spline width of selected splines and all new open splines.                                                                                                                                                                                                                     |
| start type        | openspline_start_end_type | rounded       | Sets the style of the first point for the selected spline (s) and all new open splines: <ul style="list-style-type: none"> <li>• <b>rounded</b> - the starting point of the spline has a rounded end.</li> <li>• <b>square</b> - the starting point of the spline has a square end.</li> </ul>  |
| end type          | openspline_last_end_type  | rounded       | Sets the style of the last point for the selected spline (s) and all new open splines: <ul style="list-style-type: none"> <li>• <b>rounded</b> - the finishing point of the spline has a rounded end.</li> <li>• <b>square</b> - the finishing point of the spline has a square end.</li> </ul> |
| invert            | inverted                  | disabled      | Swaps the colors of the currently selected shape and the underlying image.                                                                                                                                                                                                                      |
| shape/stroke list | curves                    | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                       |
| Stroke Tab        |                           |               |                                                                                                                                                                                                                                                                                                 |
| source            | brush_source              | color         | Sets the color or source input for the selected stroke: <ul style="list-style-type: none"> <li>• <b>color</b> - the color specified in the <b>color</b> field.</li> <li>• <b>foreground</b> - pulls pixels from the <b>bg</b> input,</li> </ul>                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|                |                  |               | <p>including any shapes and strokes drawn on it. This input is mainly used with the <b>Clone</b> tab controls. Using it may cause slower renders.</p> <ul style="list-style-type: none"> <li>• <b>background</b> - pulls pixels from the <b>bg</b> input, not including any shapes or strokes drawn on it.</li> <li>• <b>backgrounds 1 to 3</b> - pulls pixels from <b>bg1</b>, <b>bg2</b>, and <b>bg3</b> inputs.</li> </ul>                                                                                                                                                                                                                                                                  |
| brush type     | brush_type       | paint         | <p>Brush types selected from the control panel only affect existing strokes. Use the Viewer tools to create new strokes.</p> <p>Specify the brush type for the selected stroke:</p> <ul style="list-style-type: none"> <li>• <b>paint</b> - applies colored or blended paint strokes.</li> <li>• <b>smear</b> - pulls the pixels under the cursor in the direction of the paint stroke.</li> <li>• <b>blur</b> - blurs the area under the paint stroke. You can adjust the blur amount using the <b>effect</b> control.</li> <li>• <b>sharpen</b> - sharpens the area under the paint stroke by increasing contrast. You can adjust the sharpening using the <b>effect</b> control.</li> </ul> |
| brush size     | brush_size       | 25            | <p>Sets the brush stroke diameter in pixels.</p> <p>Alternatively, you can <b>Shift</b>+drag in the Viewer to set the brush size.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| brush spacing  | brush_spacing    | 0.05          | <p>Sets the distance in pixels between paint brush dabs. A higher setting will increase the space between dabs, creating a dotted line effect when painting. A lower setting will decrease the distance and create a solid brush stroke.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| brush hardness | brush_hardness   | 0.2           | <p>Sets the brush hardness, which defines the rate of falloff from the brush center to its edge. Increasing the hardness decreases blurring at the stroke edges, and vice versa.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)             | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                   |
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|                          |                            |               | You can also tie a stroke's hardness to pen pressure by checking <b>hardness</b> next to <b>pressure alters</b> .                                                                                                                                                                                                                                                          |
| effect                   | effect_parameter1          | 0             | Controls the strength of blur and sharpen brush strokes. <b>Paint</b> and <b>smear</b> brushes do not use this control.                                                                                                                                                                                                                                                    |
| pressure alters opacity  | dynamic_transparency       | enabled       | When enabled, a stroke's opacity is tied to pen pressure.                                                                                                                                                                                                                                                                                                                  |
| pressure alters size     | dynamic_size               | disabled      | When enabled, a stroke's brush size is tied to pen pressure.                                                                                                                                                                                                                                                                                                               |
| pressure alters hardness | dynamic_hardness           | disabled      | When enabled, a stroke's hardness is tied to pen pressure.                                                                                                                                                                                                                                                                                                                 |
| build up                 | buildup                    | enabled       | When enabled, the stroke builds up when painted over itself.                                                                                                                                                                                                                                                                                                               |
| write on start           | writeon_start              | 0             | <p>When animating strokes, sets the order in which the dabs on a stroke appear over a number of frames.</p> <ul style="list-style-type: none"> <li>• <b>write on start</b> - set where along the stroke length the paint begins. 0 is the start of the stroke, 1 is the end.</li> <li>• <b>write on end</b> - set where along the stroke length the paint ends.</li> </ul> |
| write on end             | writeon_end                | 1             |                                                                                                                                                                                                                                                                                                                                                                            |
| shape/stroke list        | curves                     | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                  |
| Clone Tab                |                            |               |                                                                                                                                                                                                                                                                                                                                                                            |
| translate x,y            | source_transform_translate | 0,0           | <p>Moves the <b>source</b> image along the x and y axes.</p> <p>You can also adjust <b>translate</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                                                                                                 |
| rotate                   | source_transform_          | 0             | Spins the <b>source</b> image around the pivot point. Use                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                          |
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|              | rotate                  |               | <p><b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>rotate</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                                  |
| scale        | source_transform_scale  | 1             | <p>Resizes the <b>source</b> image on the x and y axes.</p> <p>You can also adjust <b>scale</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                             |
| skew X       | source_transform_skewX  | 0             | <p>Skews the <b>source</b> along the X axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>skew</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p> |
| skew Y       | source_transform_skewY  | 0             | <p>Skews the <b>source</b> along the Y axis from the pivot point. Use <b>center x,y</b> to position the pivot point.</p> <p>You can also adjust <b>skew</b> values by dragging the transform handles in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p> |
| skew order   | skew_order              | XY            | <p>Sets the order in which <b>skew X</b> and <b>skew Y</b> are applied:</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - <b>Skew X</b> is applied before <b>skew Y</b>.</li> <li>• <b>YX</b> - <b>Skew Y</b> is applied before <b>skew X</b>.</li> </ul>                                  |
| center x,y   | source_transform_center | N/A           | <p>Adjusts the center of rotation and skew on the x and y axes. This control does not translate the <b>source</b> image.</p> <p>You can also adjust <b>center</b> values by <b>Ctrl/Cmd+Shift</b> and dragging the transform handle</p>                                                           |

| Control (UI)   | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------|------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                        |               | <p>in the Viewer.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| round to pixel | source_translate_round | disabled      | <p>Rounds the <b>translate x,y</b> amount to the nearest whole integer pixel. This can help you avoid softening when using filtering.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| filter         | source_filter          | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <div>  <p><b>Note:</b> If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, the <b>filter</b> dropdown is disabled.</p> </div> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown</li> </ul> |

| Control (UI)  | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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|               |                         |               | <p>by the negative -y portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| black outside | source_black_outside    | disabled      | <p>When rotating or translating the <b>source</b> image, a part of the image area may get cropped. To fill the cropped portion with black, check <b>black outside</b>. To fill the cropped portion by expanding the edges of the image, uncheck <b>black outside</b>.</p> <p>If <b>source</b> is set to <b>color</b>, this control is disabled.</p>                                                                                                                                                                                                                                                                  |
| time offset   | source_time_offset      | 0             | <p>Allows you to clone or reveal pixels from a different frame. Time offset is either <b>relative</b> to the current frame (-1 is the frame previous to the current one) or <b>absolute</b> (1 is the first frame in the clip).</p> <div>  <p><b>Note:</b> If <b>source</b> is set to <b>color</b> on the <b>Shape</b> tab, this control is disabled.</p> </div>                                                                                                                                                                  |
|               | source_time_offset_type | relative      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| view          | source_view             | current       | <p>Sets the view used as the clone source. To use the view currently displayed in the Viewer, select <b>current</b>.</p> <p>This is only displayed if you have set up more than one view in your Project Settings (typically, if you're working on a stereoscopic project).</p>                                                                                                                                                                                                                                                                                                                                      |
| shape/stroke  | curves                  | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| list              |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Lifetime Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| lifetime type     | lifetime_type    | single frame  | <p>Sets the range of frames during which the currently selected shape, stroke or group is visible:</p> <ul style="list-style-type: none"> <li>• <b>all</b> - the selection appears in all frames of the composition.</li> <li>• <b>start to frame</b> - the selection appears from the first frame to the specified to frame.</li> <li>• <b>single frame</b> - the selection appears on one frame only. You can specify the frame in the <b>from</b> control.</li> <li>• <b>to end</b> - the selection appears from the specified <b>from</b> frame to the last frame.</li> <li>• <b>range</b> - the selection appears from the specified <b>from</b> frame up to the specified to frame.</li> </ul> |
| from              | lifetime_start   | 1             | Sets the first frame for <b>single</b> , <b>to end</b> , and <b>range</b> lifetime types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| to                | lifetime_end     | 1             | Sets the last frame for <b>start to frame</b> and <b>range</b> lifetime types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| shape/stroke list | curves           | N/A           | See the <b>RotoPaint</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Tracking Tab     |                  |               |                                                                                                                                              |
| Settings         |                  |               |                                                                                                                                              |
| track channels   | channels         | rgb           | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p> |
| pre-track filter | pretrack_filter  | none          | Before image patches are compared, the selected filter is                                                                                    |

| Control (UI)                        | Knob (Scripting)             | Default Value          | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------|------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                              |                        | <p>applied. You can select one of the following options:</p> <p><b>none</b> - This disables all pre-filtering, which allows you to have full control of tuning the input image for tracking.</p> <p><b>adjust contrast</b> - This stretches the image contrast to better suit the tracking algorithm. This option is recommended.</p>                                                                                                                                                                                                                                                                                                                                                        |
| adjust for luminance changes        | adjust_for_luminance_changes | disabled               | Enabling this option performs extra pre-filtering to help compensate for changes in brightness in the image over time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| clamp super-white, sub-zero footage | clamp_footage                | enabled                | <p>When enabled, the pixel values in the tracked area are clamped between 0-1.</p> <p>If you want to track the full dynamic range of your footage, you should disable this control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| hide progress bar                   | hide_progress_bar            | disabled               | When enabled, the tracking progress bar is hidden.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Export                              |                              |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| export menu                         | export_menu                  | CornerPin2D (relative) | <p>Sets the node type to export the track data:</p> <p><b>CornerPin2D (relative)</b> - warp the image according to the relative transform between the current frame and the reference frame.</p> <p><b>CornerPin2D (absolute)</b> - set the to positions to the corners of the planar surface, and the from positions to the dimensions of the currently selected node. This option places the incoming image entirely inside the planar surface.</p> <p><b>CornerPin2D (stabilize)</b> - applies the inverse transform of the track to stabilize the image. This option locks down the image so that the tracked plane effectively doesn't move - can be very useful for applying drift</p> |

| Control (UI)     | Knob (Scripting) | Default Value                       | Function                                                                                                                                                                                                                                                                                                                                |
|------------------|------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |                                     | corrections.<br><br><b>Tracker</b> - creates a four-corner Tracker node with each of the trackers taking the positions of planar surface corners. This allows you to use the Tracker's transform functions to stabilize, reduce jitter, and so on. This export option is always baked out in order for the transform to work correctly. |
| create           | export_button    | N/A                                 | Click to create the selected node containing the track data.                                                                                                                                                                                                                                                                            |
| link output      | link_output      | enabled                             | When enabled, create a link between RotoPaint and the exported node, so that when the track updates, the points are updated too.                                                                                                                                                                                                        |
| Correction       |                  |                                     |                                                                                                                                                                                                                                                                                                                                         |
| CornerPin points |                  |                                     |                                                                                                                                                                                                                                                                                                                                         |
| point1 xy        | pt1              | N/A                                 | The CornerPin points are populated automatically when you track an object. When you draw a roto shape and convert it into a track object, Nuke automatically places 4 corner pins around the shape. These are the points that are tracked.                                                                                              |
| point2 xy        | pt2              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| point3 xy        | pt3              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| point4 xy        | pt4              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| Offsets          |                  |                                     |                                                                                                                                                                                                                                                                                                                                         |
| offset1 xy       | of1              | N/A                                 | You can correct the four automatically placed points by offsetting any or all of the four points. To offset a point, simply click and drag it in the Viewer to the correct position.                                                                                                                                                    |
| offset2 xy       | of2              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| offset3 xy       | of3              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| offset4 xy       | of4              |                                     |                                                                                                                                                                                                                                                                                                                                         |
| reference frame  | reference_frame  | The first frame used to track from. | The frame used as a reference to compare all other frames containing tracking data.                                                                                                                                                                                                                                                     |
| shape list       | curves           | N/A                                 | See the <b>Roto</b> tab for the shape list controls.                                                                                                                                                                                                                                                                                    |

# ScannedGrain

Applies actual scans of film grain to replicate the grain of the film stock. Frames are selected from a loop of scanned film grain and applied to the input image. This allows you to add grain to CG creations to match the original plate or 'age' footage artificially.

See also [Grain](#) and [F\\_ReGrain](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the grain.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the grain is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)     | Knob (Scripting) | Default Value                        | Function                                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ScannedGrain Tab |                  |                                      |                                                                                                                                                                                                                                                                                                                                           |
| grain            | fullGrain        | [file dir \$program_name]/FilmGrain/ | <p>Sets the file path of your scanned grain images.</p> <p>To create the film grain images:</p> <ol style="list-style-type: none"> <li>1. Film a gray card and scan the result to file.</li> <li>2. Blur the scanned image.</li> <li>3. Subtract the blurred image from the original.</li> <li>4. Add 0.5 to the rgb channels.</li> </ol> |

| Control (UI)    | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                   |
|-----------------|-----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                       |               | 5. Save the scanned grain image to the desired file type (.rgb for example).                                                                                                                                               |
| frame range     | fullGrain.first_frame | 1             | Sets the first frame of the grain file to use.                                                                                                                                                                             |
|                 | fullGrain.last_frame  | 50            | Sets the last frame of the grain file to use. Approximately 50 frames are required to produce random grain.                                                                                                                |
| min. width      | minwidth              | 721           | <p>Sets the minimum width (in pixels) that images must have in order for grain to be applied.</p> <p>Set a minimum width to ensure that the grain resolution matches the image otherwise you may get unwanted results.</p> |
| resize          | resize                | enabled       | <p>When enabled, resizes the <b>grain</b> plate to match your input.</p> <p>When disabled, the grain plate is cropped to match.</p>                                                                                        |
| flip            | flip                  | disabled      | Increases the number of grain images available by allowing random horizontal and vertical flipping of the grain plate. Flipping can produce a more random grain spread, but increases processing time.                     |
| offset          | offset                | 0.5           | Sets the value of neutral gray to subtract from images. The closer this value is to the input gray, the more grain is visible.                                                                                             |
| Amount of grain |                       |               |                                                                                                                                                                                                                            |
| amount rgb      | amount                | 0.30000001    | Sets the multiplier for the red channel applied to the grain.                                                                                                                                                              |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                           |
|-----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  | 0.40000001    | Sets the multiplier for the green channel applied to the grain.                                                                                                                                                                                                                                    |
|                       |                  | 0.5           | Sets the multiplier for the blue channel applied to the grain.                                                                                                                                                                                                                                     |
| saturation            | saturation       | 1             | Sets the intensity of grain hue across all channels.                                                                                                                                                                                                                                               |
| use precomputed table | use_precomputed  | enabled       | <p>When enabled, the output LUT is clamped between 0 and 1. This control is enabled by default for backward compatibility.</p> <p>When disabled, Nuke does not clamp the LUT.</p>                                                                                                                  |
| curve editor          | weight           | N/A           | The <b>grain</b> sequence's color curves. You can use these to edit the gain, gamma, contrast, and so on for individual channels. You can also look up color information for the current pixel in the Viewer.                                                                                      |
| reset                 | N/A              | N/A           | Returns the selected curve(s) to the default values.                                                                                                                                                                                                                                               |
| low_clip              | low_clip         | 0             | <p>Sets the low threshold based on the input image.</p> <p>In general, when grain is added to an image, some input pixel values become higher, while others become lower. This control allows you to stop pixel values from going below a certain value, such as the blackpoint in your image.</p> |
| seed                  | seed             | 1             | <p>A different grain pattern is produced for each frame. Change this number to get a different initial pattern, for instance if you are using multiple <b>ScannedGrain</b> nodes.</p> <p>If you require an identical grain plate for every frame, enter <b>-frame</b> in this field.</p>           |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the grain is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                               |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that grain is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                        |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the grain before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one ScannedGrain node.</p> <p>If you are using unpremultiplied input images,</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------|
|              |                  |               | you should leave this set to <b>none</b> .                                |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                           |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full grain effect at 1. |

# Sparkles

Creates customizable rays or sparkles from a central **position** indicator in the Viewer.

## Inputs and Controls

| Connection Type | Connection Name | Function                                    |
|-----------------|-----------------|---------------------------------------------|
| Input           | unnamed         | The image sequence to receive the sparkles. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sparkles Tab |                  |               |                                                                                                                                                                                                                                                                                          |
| Shape        |                  |               |                                                                                                                                                                                                                                                                                          |
| Sparkle type | mode             | Rays          | Sets the sparkle type to output from the <b>position</b> indicator in the Viewer: <ul style="list-style-type: none"> <li>• <b>Rays</b> - produces rays fading away from the origin.</li> <li>• <b>Sparkles</b> - produces intermittent rays fading at either end of each ray.</li> </ul> |



| Control (UI)    | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                         |
|-----------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                   |               | <ul style="list-style-type: none"> <li>• <b>Fireworks</b> - produces rays fading toward the origin.</li> </ul>                                                                                                                                                                                                   |
| triangle shapes | triangle_thick    | disabled      | When enabled, a triangle shape is used to create the rays increasing the thickness.                                                                                                                                                                                                                              |
| position xy     | position          | 700, 600      | Sets the center of origin for the rays on the x and y axes.                                                                                                                                                                                                                                                      |
| size            | size              | 300           | Sets the size of the rays, in pixels, and adjusts the ray bounding box accordingly. <div>  <b>Note:</b> When <b>Sparkle type</b> is set to <b>Sparkles</b>, this control determines the size of the longest ray.         </div> |
| anamorphic      | anamorphic        | 1             | Sets the anamorphic ratio of the bounding box. Negative values decrease width and vice versa.                                                                                                                                                                                                                    |
| rotation        | rotation          | 0             | Sets the amount of rotation applied to the rays. Negative values produce clockwise rotation and vice versa.                                                                                                                                                                                                      |
| relative        | relative_rotation | disabled      | When enabled, 0 degrees always points to the center of the image and rotation is relative to that value.                                                                                                                                                                                                         |
| rays Nb         | ray_nb            | 50            | Sets the number of rays emitted.                                                                                                                                                                                                                                                                                 |
| thickness       | ray_thick         | 0.2           | Sets the thickness of the emitted rays in pixels.                                                                                                                                                                                                                                                                |
| random          | random_thick      | disabled      | When enabled, ray thickness is randomized within the range [1,thickness].                                                                                                                                                                                                                                        |
| sparkle falloff | spark_falloff     | 0.05          | When <b>Sparkle type</b> is set to <b>Sparkles</b> , determines whether or not rays are connected to the position indicator. Higher values decrease the distance from the sparkle to the position indicator and vice versa.                                                                                      |
| ray falloff     | ray_falloff       | 2             | Sets how quickly rays falloff as distance from the                                                                                                                                                                                                                                                               |

| Control (UI)                                               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                             |
|------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                            |                  |               | position indicator increases.                                                                                                                                                                                                                        |
|                                                            |                  |               |  <b>Note:</b> This control behaves differently depending on the <b>Sparkle type</b> selected. For example, <b>Fireworks</b> falloff towards the position indicator. |
| seed                                                       | seed             | 23            | Sets the random seed that controls ray characteristics. If you're using multiple Sparkle nodes, you can use the same seed to produce similar random results on both nodes.                                                                           |
| Color                                                      |                  |               |                                                                                                                                                                                                                                                      |
| brightness                                                 | brightness       | 1             | Sets ray brightness - higher values increase brightness.                                                                                                                                                                                             |
| color                                                      | color            | 1             | Sets the ray color.                                                                                                                                                                                                                                  |
| chroma shift                                               | chroma_shift     | 0             | Sets the amount of chroma shift applied to the rays. Positive values split red clockwise and blue counter-clockwise and vice versa.                                                                                                                  |
| chroma spread                                              | chroma_spread    | 0             | Sets the spread of chroma values from the position indicator. Positive values extend the spread of the red channel while reducing the blue channel and vice versa.                                                                                   |
| Mask                                                       |                  |               |                                                                                                                                                                                                                                                      |
| mask                                                       | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                        |
|                                                            | vismask          | none          | The channel to use as a mask. By default, the sparkles are limited to the non-black areas of this channel.                                                                                                                                           |
| mask blur                                                  | vismask_size     | 4             | Sets the size of the mask when <b>mask</b> is set to anything other than <b>none</b> .                                                                                                                                                               |
| Effects Tab                                                |                  |               |                                                                                                                                                                                                                                                      |
| Sparkle crawl - These controls do not affect <b>Rays</b> . |                  |               |                                                                                                                                                                                                                                                      |

| Control (UI)            | Knob (Scripting)    | Default Value | Function                                                                                                               |
|-------------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------|
| Sparkle crawl           | sparkle_crawl       | disabled      | When enabled, use the <b>Sparkle crawl</b> controls to cause <b>Sparkles</b> or <b>Fireworks</b> to move, or crawl.    |
| motion                  | motion              | 300           | Sets the amount of motion to apply. Animating this control causes <b>Sparkles</b> or <b>Fireworks</b> to crawl.        |
| direction               | direction           | 0             | Sets the direction of crawl in degrees. Animate this control to produce more crawl.                                    |
| ray fade                | fadeTolerance       | 30            | Controls the amount of fade to apply to <b>Sparkles</b> only.                                                          |
| Broken rays             |                     |               |                                                                                                                        |
| Broken rays             | broken_rays         | disabled      | When enabled, use the <b>Broken rays</b> controls affect the rays emitted from the position indicator.                 |
| % ray affected          | broken_affected     | 50            | Sets the percentage of rays to affect with breaks.                                                                     |
| break start             | broken_start        | 0.7           | Sets where the first break occurs as a percentage of the total length. For example, 0.5 is equal to 50% of the length. |
| random                  | random_broken_start | disabled      | When enabled, the <b>break start</b> control is randomized.                                                            |
| breaks                  | broken_holes        | 0.2           | Sets the number of breaks per ray after the <b>break start</b> .                                                       |
| random                  | random_broken_holes | disabled      | When enabled, the <b>breaks</b> control is randomized.                                                                 |
| Sparks                  |                     |               |                                                                                                                        |
| sparks (direction clip) | sparks              | disabled      | When enabled, use the <b>Sparks</b> controls to clip the emission angle and direction.                                 |
| direction               | sparks_direction    | 0             | Sets the ray's emission direction in degrees.                                                                          |
| open angle              | sparks_angle        | 45            | Sets the angle from which rays can be emitted. For example, 360 causes rays to emit in all directions.                 |

# Text

This node lets you add text overlays on your images. You can simply type in the text you want to have displayed or use Tcl expressions or Tcl variables to create a text overlay. Text overlays can also be animated using animation layers in the **Groups** tab, so that their properties (such as position, size, and color) change over time. These features make the Text node useful, for example, for creating slates or scrolling credits.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the text overlay.                                                                                                                                                                                                                                                                                                                         |
|                 | mask            | <p>An optional image to use as a mask. By default, the text is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                         |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Text Tab     |                  |               |                                                                                                                                                                                                  |
| output       | output           | rgba          | <p>The text only appears in these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| premult      | premult          | none          | These channels are multiplied by the drawn text, so that they are set to black outside the text shape.                                                                                           |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| clip to      | cliptype         | format        | <p>Select how to restrict the output image:</p> <ul style="list-style-type: none"> <li>• <b>no clip</b> - use the entire image.</li> <li>• <b>bbox</b> - restrict the output image to the incoming bounding box.</li> <li>• <b>format</b> - restrict the output image to the incoming format area.</li> <li>• <b>union bbox+format</b> - restrict the output image to the combination of the incoming bounding box and format area.</li> <li>• <b>intersect bbox+format</b> - restrict the output image to the intersection of the incoming bounding box and format area.</li> </ul> |
| replace      | replace          | disabled      | <p>When enabled, the affected channels are cleared to black before drawing on them.</p> <p>When disabled, the text is drawn on top of the input image.</p>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| invert       | invert           | disabled      | Inverts the inside and outside of the text shape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| opacity      | opacity          | 1             | Adjusts the opacity of the text. The possible values run from 0 (invisible) to 1 (fully opaque).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the text is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the text is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| message      | message          | None          | <p>Enter the text you want to display, a Tcl expression, a Tcl variable, or a combination of these. Enter Tcl expressions in square brackets, for example, <b>[date]</b>. To begin a new line, press <b>Return</b>.</p> <p>To display special Unicode characters, such as foreign language characters and copyright signs, you can:</p> <ul style="list-style-type: none"> <li>• use HTML named entities, such as <b>&amp;copy;</b> to display ©</li> <li>• use hex entities, such as <b>&amp;#xa9;</b> to display ©</li> <li>• use decimal entities, such as <b>&amp;#169;</b> to display ©</li> <li>• type Unicode characters, such as ©, on your keyboard or cut and paste them from other applications. UTF-8 character encoding is used to store them in the control's value and in the saved Nuke script.</li> </ul> <p>The above only work if the font you are using has the character you want to display in it.</p> <div>  <p><b>Note:</b> We recommend using the above entities rather than typing <code>&lt;</code>, for example. This is because future versions of the Text node may interpret HTML mark-up. In HTML, some characters, such as the greater than and less than signs, are reserved. If you used these signs within your text now, future versions could mistake them for HTML mark-up.</p> </div> <p>See <i>Creating Text Overlays</i> in the <i>Nuke User Guide</i>,</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |               | <p>for examples of Tcl expressions, Tcl variables, HTML named entities, hex entities, and decimal entities you can use in the Text node.</p> <div>  <b>Tip:</b> To get a list of all the Tcl expressions you can use with <b>date</b>, you can also type <b>X</b> on the Node Graph, set the script command dialog that opens to <b>Tcl</b>, enter <b>date -h</b>, and click <b>OK</b>. </div>                                                                                                       |
| box xyrt (or xywh) | box              | N/A           | <p>Adjusts the on-screen box that limits the text inside a certain area of the frame:</p> <ul style="list-style-type: none"> <li>• To define the left boundary of the box, adjust the <b>x</b> field.</li> <li>• To define the bottom boundary of the box, adjust the <b>y</b> field.</li> <li>• To define the right/width boundary of the box, adjust the <b>r</b> field.</li> <li>• To define the top/height boundary of the box, adjust the <b>t</b> field.</li> </ul> <p>You can also move and resize the box in the Viewer. Your text is wrapped inside the box you defined.</p> |
| justify            | xjustify         | left          | <p>Sets how to align the text horizontally:</p> <ul style="list-style-type: none"> <li>• <b>left</b> - align the text along the left edge of the on-screen text box. This leaves the right edge of the text ragged.</li> <li>• <b>center</b> - align the text from the center of the on-screen text box. This leaves both edges of the text ragged.</li> <li>• <b>right</b> - align the text along the right edge of the on-screen text box. This leaves the left edge of</li> </ul>                                                                                                  |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | <p>the text ragged.</p> <ul style="list-style-type: none"> <li>• <b>justify</b> - align the text both along the left and the right edge of the on-screen text box. This leaves no ragged edges. The justification is done by expanding the spaces between letters. If there are no spaces or the spaces get more than about three times wider than they were, letters are expanded.</li> </ul>                                                                                |
|                   | yjustify          | top           | <p>Sets how to align the text vertically:</p> <ul style="list-style-type: none"> <li>• <b>top</b> - align the text against the top edge of the on-screen text box.</li> <li>• <b>center</b> - align the text from the center of the on-screen text box.</li> <li>• <b>bottom</b> - align the text against the bottom edge of the on-screen text box.</li> </ul>                                                                                                               |
| font              | font              | Utopia        | <p>Sets the font to use for the text. This control uses the FreeType library and supports a large number of fonts, including TrueType (.ttf) fonts and PostScript fonts (.pfa and .pfb).</p> <div>  <b>Tip:</b> You can limit the Text node to only use the fonts that ship with Nuke by navigating to <b>Project Settings &gt; Font</b> and disabling <b>include system fonts</b>. </div> |
|                   | index             | Regular       | <p>Sets the font style to use for the text. The options available in this control depend on the <b>font</b> selected.</p>                                                                                                                                                                                                                                                                                                                                                     |
| global font scale | global_font_scale | 1             | <p>Sets the scale used to multiply the <b>font size</b> for all characters in the message field.</p>                                                                                                                                                                                                                                                                                                                                                                          |
| font size         | font_size         | 100           | <p>Adjusts the size of the font. When <b>leading</b> is set to 0, this parameter also controls the spacing</p>                                                                                                                                                                                                                                                                                                                                                                |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>between each line of text.</p> <p>When rendering the font, the <b>size</b> parameter controls the font hinting used. Font hinting adjusts which pixels are interpolated to more clearly render a font. At small sizes and on low resolution output devices, it has a big impact on the legibility of the font. For best results, you should use this parameter (rather than the <b>scale</b> parameter on the <b>Transform</b> tab) to control the size of the font and keep <b>scale</b> set to 1.</p> |
| font width     | font_width       | 100           | Sets the width of the font, as a percentage of the font size.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| font height    | font_height      | 100           | Sets the height of the font, as a percentage of the font size.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| kerning        | kerning          | 0             | <p>Sets the spacing between the currently selected character and the previous character. Negative values move the character closer to the previous character and vice versa.</p> <div>  <b>Note:</b> Kerning has no effect on multiple selections or the first character in a string. </div>                                                                                                                            |
| tracking       | tracking         | 0             | <p>Sets the spacing between each character and the previous character. Negative values move characters closer to each other and vice versa.</p> <div>  <b>Note:</b> Tracking has no effect on the last character in a string. </div>                                                                                                                                                                                    |
| baseline shift | baseline_shift   | 0             | Sets the height above the font baseline for the currently selected characters. Negative values                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)                                                                                   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                |                  |               | lower the characters and vice versa.                                                                                                                                                                                                                                                                                                                                                          |
| leading                                                                                        | leading          | 0             | Sets the spacing between lines of text. Negative values decrease the spacing and vice versa.                                                                                                                                                                                                                                                                                                  |
| Groups Tab - the controls on this tab only affect groups in the <b>animation layers</b> table. |                  |               |                                                                                                                                                                                                                                                                                                                                                                                               |
| translate xy                                                                                   | translate        | 0, 0          | Translates the text on the x and y axes.                                                                                                                                                                                                                                                                                                                                                      |
| rotate                                                                                         | rotate           | 0             | Rotates the text by degrees. Negative values produce anti-clockwise rotation.                                                                                                                                                                                                                                                                                                                 |
| scale                                                                                          | scale            | 1             | Scales the text. Scale width and height are ganged by default.                                                                                                                                                                                                                                                                                                                                |
| skew X                                                                                         | skewX            | 0             | Skews the text on the x axis.                                                                                                                                                                                                                                                                                                                                                                 |
| skew Y                                                                                         | skewY            | 0             | Skews the text on the y axis.                                                                                                                                                                                                                                                                                                                                                                 |
| skew order                                                                                     | skew_order       | XY            | <p>Sets the order in which <b>skew X</b> and <b>skew Y</b> are applied:</p> <ul style="list-style-type: none"> <li>• <b>XY</b> - skew X is applied before skew Y.</li> <li>• <b>YX</b> - skew Y is applied before skew X.</li> </ul>                                                                                                                                                          |
| center xy                                                                                      | center           | N/A           | Sets the center of rotation and scaling. You can also move it using <b>Ctrl/Cmd</b> +drag.                                                                                                                                                                                                                                                                                                    |
| animation layers                                                                               | group_animation  | N/A           | <p>Displays groups created from the text in the <b>message</b> field, allowing you to animate the required characters using the transform controls.</p> <p>Select the required text in the Viewer or <b>message</b> field and then click the <b>+</b> button to create an animation layer. Select the group and apply the required transforms using the controls on the <b>Group</b> tab.</p> |
| Color Tab                                                                                      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                               |
| ramp                                                                                           | ramp             | none          | Select whether to create a color gradient across                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>the text:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't create a color gradient.</li> <li>• <b>linear</b> - the ramp changes linearly from one color into another.</li> <li>• <b>smooth0</b> - the ramp color gradually eases into the point 0 end. This means colors in the point 0 end are spread wider than colors in the point 1 end.</li> <li>• <b>smooth1</b> - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread wider than colors in the point 0 end.</li> <li>• <b>smooth</b> - the ramp color gradually eases into both ends. This means colors in the point 0 and point 1 ends are spread wider than colors in the center of the ramp.</li> </ul> |
| color        | color            | 1             | <p>Sets the color for the text.</p> <p>If <b>ramp</b> is set to anything other than <b>none</b>, this is the color for the ramp at the point 1 end (by default, the top end).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

The following controls are only available if **ramp** is set to anything other than **none**.

|             |                |          |                                                                                                         |
|-------------|----------------|----------|---------------------------------------------------------------------------------------------------------|
| point 1     | p1             | 100, 400 | Sets the position of the point 1 indicator. This allows you to adjust the spread and angle of the ramp. |
| color 0     | color0         | 0        | Sets the color for the ramp at the point 0 end (by default, the bottom end).                            |
| point 0     | p0             | 100, 100 | Sets the position of the point 0 indicator. This allows you to adjust the spread and angle of the ramp. |
| Shadows Tab |                |          |                                                                                                         |
| enable drop | enable_shadows | disabled | When enabled, drop shadows are applied to the                                                           |

| Control (UI)        | Knob (Scripting)           | Default Value | Function                                                                                                                                                                         |
|---------------------|----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| shadows             |                            |               | text.<br><br>When disabled, all other controls on this tab are also disabled.                                                                                                    |
| inherit input color | shadow_inherit_input_color | disabled      | When enabled, shadows inherit their color from the text's input color.<br><br>When disabled, the color controls are enabled, allowing you to set the shadow color independently. |
| color               | color                      | 0,0,0,1       | Sets the color of the drop shadow when <b>inherit input color</b> is disabled.                                                                                                   |
| opacity             | opacity                    | 0.7           | Sets the opacity of any drop shadow applied to the text, where 0 is totally transparent and 1 is totally opaque.                                                                 |
| angle               | angle                      | 225           | Sets the cast angle for drop shadows relative to the text, in degrees, where 0 is left to right.                                                                                 |
| distance            | distance                   | 5             | Sets the separation distance between the text and the drop shadow.                                                                                                               |
| softness            | softness                   | 0             | Sets the softness, or blur, of any drop shadow applied to the text. Higher values produce greater blur.                                                                          |
| shrink/expand       | shrink/expand              | 0             | Sets the thickness of drop shadows relative to the text. Negative values produce thinner shadows and vice versa.                                                                 |

# Time Nodes

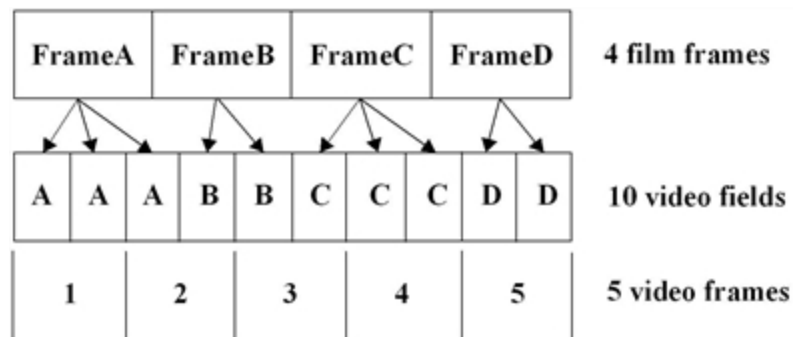
Time nodes deal with distorting time (that is, slowing down, speeding up, or reversing clips), applying motion blur, and performing editorial operations like slips, cuts, splices, and freeze frames.

## Add 3:2 pulldown

Adds 3:2 pulldown to the input footage.

3:2 pulldown is a process of converting 24 frames per second (fps) film to 29.97 fps interlaced video. In this process, the film is first slowed down 0.1% to match the speed difference between 29.97 fps and 30 fps. Then, film frames are distributed across video fields in a repeating 3:2 pattern in order to make 24 film frames fill the space of 30 video frames per second:

- The first frame of film is copied to 3 fields of video,
- the second frame of film is copied to 2 fields of video,
- the third frame of film is again copied to 3 fields,
- the fourth frame of film is copied to 2 fields, and so on.



If you're using footage that was originally film but was converted to video, you may have used the Remove 3:2 pulldown node when importing the footage to Nuke. In this case, the Add 3:2 pulldown node allows you to reintroduce 3:2 pulldown before rendering the footage back to video.

See also [Remove 3:2 pulldown](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                   |
|-----------------|-----------------|--------------------------------------------|
| Input           | 1               | The image sequence to add 3:2 pulldown to. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| phase        | phase            | 0             | <p>The 3:2 pulldown process results in:</p> <ul style="list-style-type: none"> <li>• three whole frames that contain two fields from the same film frame, and</li> <li>• two split-field frames that contain fields from two different film frames. The two split-field frames are always adjacent to each other.</li> </ul> <p>This control lets you shift the point at which the two split-field frames occur within the first five frames of the footage, relative to your first input frame.</p> |

# AppendClip

AppendClip lets you *splice* clips. Splicing refers to joining clips head-to-tail, thus allowing action to flow from one shot to the next. When you splice clips, you have options for:

- Fading to or from black.
- Dissolving between input clips.
- Slipping the combined clip in time.

To make an edit, you can first use the FrameRange node to cut portions out of input sequences and then use the AppendClip node to link them together.

See also [FrameRange](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------|
| Input           | 1               | The image sequence to which subsequent clips are appended. You can connect any number of sequences to an AppendClip node. |

| Control (UI)                  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                             |
|-------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AppendClip Tab                |                  |               |                                                                                                                                                                                                                                                                                                      |
| Fade In                       | fadeIn           | 0             | Sets the number of frames to fade in from black on the first clip in the sequence.                                                                                                                                                                                                                   |
| Fade Out                      | fadeOut          | 0             | Sets the number of frames to fade out to black on the last clip in the sequence.                                                                                                                                                                                                                     |
| Cross Dissolve                | dissolve         | 0             | <p>Sets the number of frames to use to dissolve between clips.</p> <p>Bear in mind that differences in format between dissolved clips are not catered for, so you may want to use <b>Cross Dissolve</b> in conjunction with Reformat nodes.</p>                                                      |
| First Frame                   | firstFrame       | 1             | Sets the amount of frames to slip the start of the first clip in the sequence. For example, a value of 5 causes the first clip to start playing at frame 5 instead of frame 1.                                                                                                                       |
| Last Frame                    | lastFrame        |               | Depending on the <b>First Frame</b> value, displays the frame number of the end of the sequence after the slip.                                                                                                                                                                                      |
| take metadata from first clip | meta_from_first  | disabled      | <p>When disabled, the metadata is taken from whichever input is currently taking precedence.</p> <p>This control was added to preserve the behavior of previous versions of Nuke, where the metadata was always taken from the first input, and is on by default when a legacy script is loaded.</p> |

# FrameBlend

The FrameBlend node interpolates frames by generating an additive composite of the frames that precede and follow it, rather than creating mere copies between the existing frames. This method creates “ghosting” around all fast moving features. The results may look odd when viewed as part of a still frame, but will contribute to smoother motion during actual playback.

You should insert this node before the temporal effect you want to influence (for example, before a Retime node).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to blend.                                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the frame blend is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                   |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FrameBlend Tab |                  |               |                                                                                                                                                                                                            |
| channels       | channels         | all           | <p>The frame blend is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| Number of      | numframes        | 5             | Sets the number of frames to blend together to                                                                                                                                                             |



| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| frames                |                  |               | <p>create the effect:</p> <ul style="list-style-type: none"> <li>• When <b>Custom</b> is disabled, blend together <b>Number of frames-1</b> previous frames and the current frame, creating a trail-like effect on moving objects.</li> <li>• When <b>Custom</b> is enabled, then the <b>Number of frames</b> are evenly distributed across the specified range.</li> </ul> |
| Frame Range           | startframe       | -1            | When <b>Custom</b> is enabled, the specified frame range is blended together producing the same result for every output frame (unless you put an expression into the frame numbers).                                                                                                                                                                                        |
|                       | endframe         | -1            |                                                                                                                                                                                                                                                                                                                                                                             |
| Custom                | userange         | disabled      | When enabled, use the <b>Frame Range</b> controls to specify the blended frame range.                                                                                                                                                                                                                                                                                       |
| Input Range           | getinputrange    | N/A           | Click to automatically use the input sequence frames as the blend <b>FrameRange</b> .                                                                                                                                                                                                                                                                                       |
| Foreground matte      | N/A              | disabled      | Enables the associated matte channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                              |
|                       | inputmask        | none          | Use this channel as a matte around a moving foreground object so that only pixels with a value of zero are blended. If you blend enough frames together and the object moves enough, the object is removed from the output to produce a clean background plate.                                                                                                             |
| output Image count to | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                               |
|                       | blendmask        | none          | <p>When enabled, saves a floating point alpha image to a channel you specify; the result indicates the number of images that contributed to each pixel of the matte.</p> <p>To normalize the alpha, divide the number 1 by the</p>                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | number of frames averaged, and then multiply the alpha channel by this result. You can also use the inverse of this matte for additional degraining. |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                        |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the blend is limited to the non-black areas of this channel.                                               |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the blend is limited to the non-white areas of the mask.                                                 |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                         |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                             |
| mix          | mix              | 1             | Mixes between the original image at 0 and the full frame blend at 1.                                                                                 |

# FrameHold

Lets you either:

- pick one frame and use that frame at every frame of the input clip, or
- use every certain number of frames of the input clip (for example, every fifth frame).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | An image sequence with a single frame or every certain number of frames you want to use, disregarding all other frames. |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                   |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FrameHold Tab        |                   |               |                                                                                                                                                                                                                            |
| first frame          | firstFrame        | 1             | The first frame to use. If <b>increment</b> is set to 0, <b>first frame</b> is used at every frame of the input clip.                                                                                                      |
| Set to Current Frame | setToCurrentFrame | N/A           | Click to set the <b>first frame</b> control to the current Viewer frame.                                                                                                                                                   |
| increment            | increment         | 0             | The increment to use when rendering every certain number of frames from the input clip. For example, if this is set to 5 and <b>first frame</b> is set to 1, Nuke only uses frames 1, 6, 11, 16, and so on from the input. |

## FrameRange

Lets you set a frame range for a clip. This controls which frames are sent to the flipbook and displayed in the Viewer when the frame range source dropdown menu is set to **Input**.

After setting the frame range for a clip, you may want to adjust the script length for the new output range. Press **S** on the Node Graph to open the **Project Settings**, and enter frame range values that match the output range you specified.

To make an edit, you can first use this node to cut portions out of input sequences and then append the results together using the [AppendClip](#) node.



**Tip:** Using FrameRange, you can also set the frame range for a clip directly in the Dope Sheet. See Nuke's [online help](#) for more information.

## Inputs and Controls

| Connection Type | Connection Name | Function                   |
|-----------------|-----------------|----------------------------|
| Input           | unnamed         | The image sequence to cut. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FrameRange Tab |                  |               |                                                                                                                                                                                                                                            |
| frame range    | first_frame      | 1             | Enter the appropriate in and out point values.<br><br>For example, if your original clip is 50 frames but you want to use only the last 25 frames in your composite, you would enter 25 as the first frame and leave the last frame at 50. |
|                | last_frame       | 100           |                                                                                                                                                                                                                                            |
| reset          | N/A              | N/A           | Resets the frame range to its original in and out points.                                                                                                                                                                                  |

## Kronos

Kronos (NukeX and Nuke Studio only) is a retimer, designed to slow down or speed up footage. It works by calculating the motion in the sequence in order to generate motion vectors, which in turn, enables you to generate an output image at any point in time throughout the sequence by interpolating along the direction of the motion. Kronos also contains a number of controls to allow you to trade off render time versus accuracy of vectors.

See also [OFlow](#), [TimeWarp](#), and [Retime](#).

## Inputs and Controls

| Connection Type | Connection Name  | Function                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | FgVecs<br>BgVecs | <p>If the motion in your input sequence has been estimated before (for example, using VectorGenerator), you can supply one or more vector sequences to Kronos to save processing time.</p> <div>  <b>Note:</b> The <b>BgVecs</b> input appears as an arrowhead on the side of the node.         </div> |
|                 | MoSrc            | An alternate Motion Source input, for example, if your <b>Source</b> sequence is very noisy and interfering with the motion estimation.                                                                                                                                                                                                                                                 |
|                 | Matte            | An optional matte of the foreground, which may improve the motion estimation by reducing the dragging of pixels that can occur between foreground and background objects.                                                                                                                                                                                                               |
|                 | Source           | The sequence to retime.                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kronos Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU    | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an</p> |

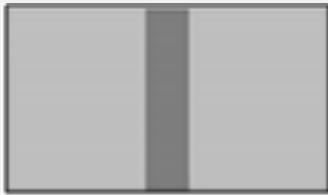
| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p>alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div>                                                                                                                                                                                                                                                                                                                                           |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Input Range          | input.first       | N/A           | <p>The first frame of input to use.</p> <p>When you first create the node, this is automatically set to the first frame of the <b>Source</b> clip. After that, it is only updated if you click <b>Reset</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | input.last        | N/A           | <p>The last frame of input to use.</p> <p>When you first create the node, this is automatically set to the last frame of the <b>Source</b> clip. After that, it is only updated if you click <b>Reset</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                 |
| Reset                | resetInputRange   | N/A           | <p>Resets <b>Input Range</b> to the frame range of the current <b>Source</b> input. This can be useful if the clip in the <b>Source</b> input has changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

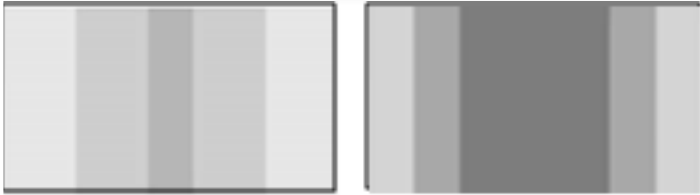
| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Channels     | retimedChannels   | all           | Sets the channels affected by the retime.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Method       | interpolation     | Motion        | <p>Sets the interpolation algorithm to use:</p> <ul style="list-style-type: none"> <li>• <b>Frame</b> - the nearest original frame is displayed.</li> <li>• <b>Blend</b> - a mix between two frames is used for the in-between frame. This is quick to render and is useful when tweaking the timing on a curve before setting the method to motion.</li> <li>• <b>Motion</b> - vector interpolation is used to calculate the in-between frame.</li> </ul>                                                                                                                                                                                                   |
| Timing       | timing2           | Output Speed  | <p>Sets how to control the new timing of the clip:</p> <ul style="list-style-type: none"> <li>• <b>Output/Input Speed</b> - describes the retiming in terms of overall output duration. For example, double speed halves the duration of the clip and half speed doubles the duration of the clip.</li> <li>• <b>Frame</b> - describes the retiming in relative terms, for example, 'at frame 100 in the output clip, display frame 50 of the source clip'. You'll need to set at least 2 key frames for this to retime the clip.</li> </ul>                                                                                                                 |
| Output Speed | timingOutputSpeed | 0.5           | <p>This control is only active if <b>Timing</b> is set to <b>Output Speed</b>.</p> <p>Values below 1 slow down the clip and vice versa. For example, to slow down the clip by a factor of two (half speed), set this value to 0.5.</p> <div>  <p><b>Note:</b> Retimes can be difficult to control using <b>Output Speed</b>, because you're retiming output frames. Altering a keyframe alters the relative position of all later frames. However, <b>Output Speed</b> keyframes do allow you to use negative speed values, unlike <b>Input Speed</b> retimes.</p> </div> |

| Control (UI) | Knob (Scripting) | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Speed  | timingInputSpeed | 0.5                 | <p>This control is only active if <b>Timing</b> is set to <b>Input Speed</b>.</p> <p>Values below 1 slow down the clip and vice versa. For example, to slow down the clip by a factor of two (half speed), set this value to 0.5.</p> <div>  <p><b>Note:</b> Retimes can be easier to control using <b>Input Speed</b>, because keyframes are set against the source frames, rather than the output frames. However, <b>Input Speed</b> keyframes do not allow you to use negative speed values, unlike <b>Output Speed</b> retimes.</p> </div> |
| Frame        | timingFrame2     | 1                   | <p>This control is active only if <b>Timing</b> is set to <b>Frame</b>.</p> <p>Use this to specify the source frame at the current frame in the timeline. For example, to slow down a 50 frame clip by half, key the <b>Frame</b> to 1 at frame 1 and the <b>Frame</b> to 50 at frame 100.</p>                                                                                                                                                                                                                                                                                                                                   |
| Motion       | motionEstimation | Dependent on script | <p>Sets the method of calculating motion estimation vectors:</p> <ul style="list-style-type: none"> <li>• <b>Local</b> - uses local block matching to estimate motion vectors. This method is faster to process, but can lead to artifacts in the output. This option is for legacy compatibility.</li> <li>• <b>Regularized</b> - uses semi-global motion estimation to produce more consistent vectors between regions.</li> </ul>                                                                                                                                                                                             |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               |  <b>Note:</b> Scripts loaded from previous versions of Nuke default to <b>Local</b> motion estimation for backward compatibility. Adding a new Kronos node to the Node Graph defaults the <b>Method</b> to <b>Regularized</b> motion estimation.                                                                                                                                                                                                                                                                         |
| Vector Detail | vectorDetail     | 0.3           | <p>Adjust this to vary the density of the vector field. A value of 1 generates a vector at each pixel, whereas a value of 0.5 generates a vector at every other pixel.</p> <p>Higher values pick up finer movement, but also increase processing time.</p>                                                                                                                                                                                                                                                                                                                                                |
| Strength      | strength         | 1.5           | <p>This control is only active if <b>Method</b> is set to <b>Regularized</b>.</p> <p>Sets the strength in matching pixels between frames. Higher values allow you to accurately match similar pixels in one image to another, concentrating on detail matching even if the resulting motion field is jagged. Lower values may miss local detail, but are less likely to provide you with the odd spurious vector, producing smoother results.</p>  <b>Note:</b> The default value should work well for most sequences. |
| Smoothness    | smoothness       | 0.5           | <p>This control is only active if <b>Method</b> is set to <b>Local</b>.</p> <p>A high smoothness can miss lots of local detail, but is less likely to provide you with the odd spurious vector, whereas a low smoothness concentrates on detail matching, even if the resulting field is jagged.</p>                                                                                                                                                                                                                                                                                                      |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               |  <b>Note:</b> The default value should work well for most sequences.                                                                                                                                                                                                                                                                                                                                                      |
| Resampling      | resampleType     | Bilinear      | <p>Sets the type of resampling applied when retiming:</p> <ul style="list-style-type: none"> <li>• <b>Bilinear</b> - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use <b>Bilinear</b> to preview a retime before using one of the other resampling types to produce your output.</li> <li>• <b>Lanczos4</b> and <b>Lanczos6</b> - these filters are good for scaling down, and provide some image sharpening, but take longer to process.</li> </ul> |
| Shutter         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Shutter Samples | shutterSamples   | 1             | <p>Sets the number of in-between images used to create an output image during the shutter time. Increase this value for smoother motion blur, but note that it takes much longer to render.</p> <div>   </div> <div> <span>Shutter Samples 2</span> <span>Shutter Samples 20</span> </div>                                        |
| Shutter Time    | shutterTime      | 0             | <p>Sets the equivalent shutter time of the retimed sequence. For example, a shutter time of 0.5 is equivalent to a 180 degree mechanical shutter, so at 24 frames per second the exposure time will be 1/48th of a second.</p> <p>Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how <b>Shutter Time</b> affects the retimed rectangle.</p>                                                                                                          |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                  |               |  <div>Shutter Time 1</div> <div>Shutter Time 0.5</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Automatic Shutter Time | autoShutterTime  | disabled      | <p>When enabled, Kronos automatically calculates the shutter time throughout the sequence.</p> <p>Note that this only produces motion blur when the retimed speed is greater than the original speed.</p>                                                                                                                                                                                                                                                                                                                                                                                                     |
| Output                 | output           | Result        | <p>Sets the final output display for the retimed image. Selecting anything other than <b>Result</b> is only useful when a <b>Matte Channel</b> is used.</p> <ul style="list-style-type: none"> <li>• <b>Result</b> - displays the retimed <b>Source</b> image.</li> <li>• <b>Matte</b> - displays the retimed <b>Matte</b> input.</li> <li>• <b>Foreground</b> - displays the retimed foreground. The background regions outside the matte input may show garbage.</li> <li>• <b>Background</b> - displays the retimed background. The foreground regions inside the matte input may show garbage.</li> </ul> |
| Matte Channel          | matteChannel     | None          | <p>Where to get the (optional) foreground mask to use for motion estimation:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the <b>Source</b> input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the <b>Source</b> input.</li> <li>• <b>Matte Luminance</b> - use the luminance of the <b>Matte</b> input.</li> <li>• <b>Matte Inverted Luminance</b> - use the inverted luminance of the <b>Matte</b> input.</li> </ul>                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Matte Alpha</b> - use the alpha of the <b>Matte</b> input.</li> <li>• <b>Matte Inverted Alpha</b> - use the inverted alpha of the <b>Matte</b> input.</li> </ul> |

## Advanced

|                      |                     |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|---------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flicker Compensation | flickerCompensation | disabled                  | <p>When enabled, Kronos takes into account variations in luminance and overall flickering, which can cause problems with your output.</p> <p>Examples of variable luminance include highlights on metal surfaces, like vehicle bodies, or bodies of water within a layer that reflect light in unpredictable ways.</p> <div>  <b>Note:</b> Using <b>Flicker Compensation</b> increases rendering time. </div> |
| Legacy Mode          | legacymodeNuke9     | Dependent on Nuke version | <p>Scripts loaded from previous versions of Nuke default to <b>Legacy Mode</b> for backward compatibility. Adding a new Kronos node to the Node Graph hides this control.</p> <p>When enabled, Kronos reverts to the legacy method for calculating <b>Output Speed</b> using the <b>Local</b> motion estimation method.</p>                                                                                                                                                                      |

## Advanced &gt; Tolerances

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weight Red      | weightRed        | 0.3           | For efficiency, much of the motion estimation is done on luminance only - that is, using monochrome images. The tolerances allow you to tune the weight of each color channel when calculating the image luminance. These parameters rarely need tuning. However, you may, for example, wish to increase the red weighting <b>Weight Red</b> to allow the algorithm to concentrate on getting the motion of a primarily red object correct, at the cost of the rest of the items in a shot. |
| Weight Green    | weightGreen      | 0.6           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weight Blue     | weightBlue       | 0.1           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Vector Spacing  | vectorSpacing    | 20            | Sets the spacing between motion vectors displayed on the Viewer when <b>Overlay Vectors</b> is enabled. The default value of 20 means every 20th vector is drawn.                                                                                                                                                                                                                                                                                                                           |
| Overlay Vectors | showVectors      | disabled      | When enabled, the motion vectors are displayed in the Viewer. Forward motion vectors are drawn in red, and backward motion vectors in blue.                                                                                                                                                                                                                                                                                                                                                 |


**Note:** Motion vectors displayed in the Viewer are added to your output if you don't turn off the overlay before rendering.

# NoTimeBlur

NoTimeBlur prevents nodes downstream from asking for fractional or multiple frames. You can use this node to avoid unwanted computation. For example, you may find that using [TimeBlur](#) on all the upstream nodes in your composition can be unnecessary and very time consuming. In these cases, you can use NoTimeBlur node to limit the number of nodes to which you're applying TimeBlur. Just insert the NoTimeBlur node in your node tree above the TimeBlur and any nodes you want the TimeBlur node to process.

You can also use the NoTimeBlur node to force animated objects to align with input images.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | NoTimeBlur can be inserted between any two existing nodes to limit requests for fractional or multiple frames downstream. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NoTimeBlur Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| rounding         | rounding         | rint          | Sets the rounding type to use when blocking fractional or multiple frames: <ul style="list-style-type: none"> <li>• <b>rint</b> - rounds the frame(s) to the nearest integer value.</li> <li>• <b>floor</b> - rounds the frame(s) down to the nearest integer value.</li> <li>• <b>ceil</b> - rounds the frame(s) up to the nearest integer value.</li> <li>• <b>none</b> - no rounding is applied to the requested frame(s).</li> </ul> |
| use single frame | single           | enabled       | When enabled, only the first frame requested is used.                                                                                                                                                                                                                                                                                                                                                                                    |

## OFlow

Lets you generate high-quality retiming operations, such as slowing down or speeding up the input footage. OFlow analyzes the movement of all pixels in the frames, generates motion vectors based on the analysis, and then renders new “in-between” images by interpolating along the direction of the motion. You can also use OFlow to add motion blur or enhance the existing motion blur in the image.

See also [Retime](#) and [Kronos](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                |
|-----------------|-----------------|-------------------------|
| Input           | Source          | The sequence to retime. |

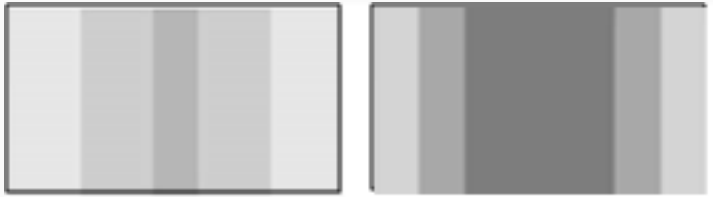
| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OFlow Tab            |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.         </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <code>--gpu</code> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Input Range  | input.first      | N/A           | <p>The first frame of input to use.</p> <p>When you first create the node, this is automatically set to the first frame of the <b>Source</b> clip. After that, it is only updated if you click <b>Reset</b>.</p>                                                                                                                                                                                                                                                                                         |
|              | input.last       | N/A           | <p>The last frame of input to use.</p> <p>When you first create the node, this is automatically set to the last frame of the <b>Source</b> clip. After that, it is only updated if you click <b>Reset</b>.</p>                                                                                                                                                                                                                                                                                           |
| Reset        | resetInputRange  | N/A           | Resets <b>Input Range</b> to the frame range of the current <b>Source</b> input. This can be useful if the clip in the <b>Source</b> input has changed.                                                                                                                                                                                                                                                                                                                                                  |
| Channels     | retimedChannels  | all           | Sets the channels affected by the retime.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Method       | method           | Motion        | <p>Sets the interpolation algorithm:</p> <ul style="list-style-type: none"> <li>• <b>Frame</b> - the nearest original frame is displayed.</li> <li>• <b>Blend</b> - a mix between two frames is used for the in-between frame. This is quick to render and is useful when tweaking the timing on a curve before setting the method to motion.</li> <li>• <b>Motion</b> - vector interpolation is used to calculate the in-between frame.</li> </ul>                                                      |



| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Timing       | timing2           | Output Speed  | <p>Sets how to control the new timing of the clip:</p> <ul style="list-style-type: none"> <li>• <b>Output/Input Speed</b> - describes the retiming in terms of overall output duration. For example, double speed halves the duration of the clip and half speed doubles the duration of the clip.</li> <li>• <b>Frame</b> - describes the retiming in relative terms, for example, 'at frame 100 in the output clip, display frame 50 of the source clip'. You'll need to set at least 2 key frames for this to retime the clip.</li> </ul>                                                                                                                 |
| Output Speed | timingOutputSpeed | 0.5           | <p>This control is only active if <b>Timing</b> is set to <b>Output Speed</b>.</p> <p>Values below 1 slow down the clip and vice versa. For example, to slow down the clip by a factor of two (half speed), set this value to 0.5.</p> <div>  <p><b>Note:</b> Retimes can be difficult to control using <b>Output Speed</b>, because you're retiming output frames. Altering a keyframe alters the relative position of all later frames. However, <b>Output Speed</b> keyframes do allow you to use negative speed values, unlike <b>Input Speed</b> retimes.</p> </div> |
| Input Speed  | timingInputSpeed  | 0.5           | <p>This control is only active if <b>Timing</b> is set to <b>Input Speed</b>.</p> <p>Values below 1 slow down the clip and vice versa. For example, to slow down the clip by a factor of two (half speed), set this value to 0.5.</p>                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               |  <b>Note:</b> Retimes can be easier to control using <b>Input Speed</b> , because keyframes are set against the source frames, rather than the output frames. However, <b>Input Speed</b> keyframes do not allow you to use negative speed values, unlike <b>Output Speed</b> retimes.                                                                                                        |
| Frame         | timingFrame2     | 1             | <p>This control is active only if <b>Timing</b> is set to <b>Frame</b>.</p> <p>Use this to specify the source frame at the current frame in the timeline. For example, to slow down a 50 frame clip by half, key the <b>Frame</b> to 1 at frame 1 and the <b>Frame</b> to 50 at frame 100.</p>                                                                                                                                                                                 |
| Vector Detail | vectorDetail     | 0.2           | <p>Adjust this to vary the density of the vector field. A value of 1 generates a vector at each pixel, whereas a value of 0.5 generates a vector at every other pixel.</p> <p>Higher values pick up finer movement, but also increase processing time.</p>                                                                                                                                                                                                                     |
| Smoothness    | smoothness       | 0.5           | <p>A high smoothness can miss lots of local detail, but is less likely to provide you with the odd spurious vector, whereas a low smoothness concentrates on detail matching, even if the resulting field is jagged.</p> <div>  <b>Note:</b> The default value should work well for most sequences.         </div>                                                                          |
| Resampling    | resampleType     | Bilinear      | <p>Sets the type of resampling applied when retiming:</p> <ul style="list-style-type: none"> <li>• <b>Bilinear</b> - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use <b>Bilinear</b> to preview a retime before using one of the other resampling types to produce your output.</li> <li>• <b>Lanczos4</b> and <b>Lanczos6</b> - these filters are good for scaling down, and provide some image sharpening,</li> </ul> |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                  |               | but take longer to process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Shutter                |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Shutter Samples        | shutterSamples   | 1             | <p>Sets the number of in-between images used to create an output image during the shutter time. Increase this value for smoother motion blur, but note that it takes much longer to render.</p> <div>  <p>Shutter Samples 2      Shutter Samples 20</p> </div>                                                                                                                                                                                                |
| Shutter Time           | shutterTime      | 0             | <p>Sets the equivalent shutter time of the retimed sequence. For example, a shutter time of 0.5 is equivalent to a 180 degree mechanical shutter, so at 24 frames per second the exposure time will be 1/48th of a second.</p> <p>Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how <b>Shutter Time</b> affects the retimed rectangle.</p> <div>  <p>Shutter Time 1      Shutter Time 0.5</p> </div> |
| Automatic Shutter Time | autoShutterTime  | disabled      | <p>When enabled, OFlow automatically calculates the shutter time throughout the sequence.</p> <p>Note that this only produces motion blur when the</p>                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)          | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                     |               | retimed speed is greater than the original speed.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Advanced              |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Flicker Compensation  | flickerCompensation | disabled      | <p>When enabled, OFlow takes into account variations in luminance and overall flickering, which can cause problems with your output.</p> <p>Examples of variable luminance include highlights on metal surfaces, like vehicle bodies, or bodies of water within a layer that reflect light in unpredictable ways.</p> <div>  <b>Note:</b> Using <b>Flicker Compensation</b> increases rendering time. </div>      |
| Advanced > Tolerances |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Weight Red            | weightRed           | 0.3           | <p>For efficiency, much of the motion estimation is done on luminance only - that is, using monochrome images. The tolerances allow you to tune the weight of each color channel when calculating the image luminance. These parameters rarely need tuning. However, you may, for example, wish to increase the red weighting <b>Weight Red</b> to allow the algorithm to concentrate on getting the motion of a primarily red object correct, at the cost of the rest of the items in a shot.</p> |
| Weight Green          | weightGreen         | 0.6           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Weight Blue           | weightBlue          | 0.1           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Vector Spacing        | vectorSpacing       | 20            | Sets the spacing between motion vectors displayed on the Viewer when <b>Overlay Vectors</b> is enabled. The default value of 20 means every 20th vector is drawn.                                                                                                                                                                                                                                                                                                                                  |
| Overlay Vectors       | showVectors         | disabled      | When enabled, the motion vectors are displayed in the Viewer. Forward motion vectors are drawn in red, and backward motion vectors in blue.                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                           |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> Motion vectors displayed in the Viewer are added to your output if you don't turn off the overlay before rendering. |

# Remove 3:2 pulldown

Removes 3:2 pulldown from the input footage.

If you're using footage that was originally film but was converted to video, you may want to use the Remove 3:2 pulldown node when importing the footage to Nuke. This allows you to convert the footage to its original state (24 fps non-interlaced film) before adding effects to it. If you later want to render the footage back to video again, you can use the [Add 3:2 pulldown](#) node to reintroduce 3:2 pulldown.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------|
| Input           | 1               | The image sequence to remove 3:2 pulldown from. For example, footage that was originally film but was converted to video. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab     |                  |               |                                                                                                                                                                                                                                                                                                                              |
| phase        | phase            | 0             | <p>The 3:2 pulldown process results in:</p> <ul style="list-style-type: none"> <li>• three whole frames that contain two fields from the same film frame, and</li> <li>• two split-field frames that contain fields from two different film frames. The two split-field frames are always adjacent to each other.</li> </ul> |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                  |               | Phase is the point at which the two split-field frames occur within the first five frames of the footage, relative to your first input frame. The value here should match the phase used when 3:2 pulldown was added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| invert field dominance | field_dom        | disabled      | <p>Video frames are usually divided into two fields. Each field contains only half of the image information, drawn as horizontal scan lines:</p> <ul style="list-style-type: none"> <li>• The first field of a frame contains every other scan line.</li> <li>• The second field of a frame contains the remaining scan lines.</li> </ul> <p>When both fields are displayed in rapid sequence, they appear to produce a normal, complete frame.</p> <p><b>Invert field dominance</b> determines which field is displayed first:</p> <ul style="list-style-type: none"> <li>• When enabled, the odd lines come first.</li> <li>• When disabled, the even lines come first.</li> </ul> |

# Retime

Lets you slow down, speed up, or even reverse select frames in a clip without necessarily altering its overall length.

See also [OFlow](#), [TimeWarp](#), and [Kronos](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                |
|-----------------|-----------------|-------------------------|
| Input           | unnamed         | The sequence to retime. |

| Control (UI) | Knob (Scripting) | Default Value           | Function                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Retime Tab   |                  |                         |                                                                                                                                                                                                                                                                                                                                                            |
| input range  | input.first      | 1                       | When enabled, sets the first frame of the input sequence to use for the retime.                                                                                                                                                                                                                                                                            |
|              | input.first_lock | disabled                | Enable this control to lock the retime to a specific first frame. <div>  <b>Note:</b> If both <b>output range</b> fields are locked, the retime is calculated to make the frame ranges match. Otherwise the output frames move to accommodate the speed.         </div> |
|              | input.last       | Dependent on input clip | When enabled, sets the last frame of the input sequence to use for the retime.                                                                                                                                                                                                                                                                             |
|              | input.last_lock  | disabled                | Enable this control to lock the retime to a specific last frame. <div>  <b>Note:</b> If both <b>output range</b> fields are locked, the retime is calculated to make the frame ranges match. Otherwise the output frames move to accommodate the speed.         </div>  |
| reverse      | reverse          | disabled                | When enabled, the input frames run backwards.                                                                                                                                                                                                                                                                                                              |
| output       | output.first     | 1                       | When enabled, sets the first frame of the clip length after                                                                                                                                                                                                                                                                                                |

| Control (UI) | Knob (Scripting)  | Default Value           | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|-------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| range        |                   |                         | the retime.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|              | output.first_lock | disabled                | Enable this control to lock the output to a specific first frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|              | output.last       | Dependent on input clip | When enabled, sets the last frame of the clip length after the retime.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|              | output.last_lock  | disabled                | Enable this control to lock the output to a specific last frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| speed        | speed             | 1                       | Sets the retime speed enabling Nuke to calculate the output range for you, rather than using the <b>output range</b> controls. Values higher than 1 increase playback speed; values less than 1 decrease playback speed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| before       | before            | hold                    | <p>Sets the behavior of frames before the <b>output.first</b> frame (examples refer to a 20 frame sequence with an <b>output.first</b> value of 5):</p> <ul style="list-style-type: none"> <li>• <b>continue</b> - the first frame in the sequence is held until the <b>output.first</b> frame is reached.</li> <li>• <b>loop</b> - substitutes an equal number of frames, effectively creating a clip loop.</li> </ul> <p>Example: 17, 18, 19, 20, 1, 2, 3, 4, etc.</p> <ul style="list-style-type: none"> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce.</li> </ul> <p>Example: 5, 4, 3, 2, 1, 2, 3, 4, etc.</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - the first frame in the sequence is held until the <b>output.first</b> frame is reached.</li> </ul> <p>Example: 1, 1, 1, 1, 1, 2, 3, 4, etc.</p> <ul style="list-style-type: none"> <li>• <b>black</b> - frames are black until the <b>output.first</b> frame is reached.</li> </ul> |
| after        | after             | hold                    | Sets the behavior of frames after the <b>output.last</b> frame (examples refer to a 20 frame sequence with an                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p><b>output.last</b> value of 5):</p> <ul style="list-style-type: none"> <li>• <b>continue</b> - the output.last frame in the sequence is held until the end of the sequence is reached.</li> <li>• <b>loop</b> - substitutes an equal number of frames, effectively creating a clip loop.</li> </ul> <p>Example: 16, 17, 18, 19, 20, 1, 2, 3, 4, etc.</p> <ul style="list-style-type: none"> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce.</li> </ul> <p>Example: 16, 17, 18, 19, 20, 19, 18, 17, etc.</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - the <b>output.last</b> frame in the sequence is held until the end of the sequence is reached.</li> </ul> <p>Example: 16, 17, 18, 19, 20, 20, 20, 20, etc.</p> <ul style="list-style-type: none"> <li>• <b>black</b> - frames are black from <b>output.last</b> until the end of the sequence is reached.</li> </ul> |
| filter       | filter           | box           | <p>Sets the type of filtering to apply to the retime:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - passes fractional frame numbers to the input, which is useful if the input can calculate its own frame interpolation.</li> <li>• <b>nearest</b> - rounds the center of the range to nearest integer frame.</li> <li>• <b>box</b> - uses a weighted average of several frames together to cover the output range.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| shutter      | shutter          | 1             | Controls frame-blending by manipulating the shutter value. Lower shutter values generate less frame-blending.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| TimeWarp Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| warp         | warp             | N/A           | <p>To warp the input clip, edit this curve as follows:</p> <ul style="list-style-type: none"> <li>• To slow down motion, decrease the slope of the curve.</li> <li>• To speed up motion, increase the slope of the curve.</li> <li>• To reverse motion, create a downward sloping portion</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>on the curve (a dip, in other words).</p> <p>You can:</p> <ul style="list-style-type: none"> <li>• <b>Ctrl/Cmd+Alt</b>+click to insert keyframe knots on the curve.</li> <li>• <b>Ctrl/Cmd</b>+drag to reposition keyframe knots.</li> <li>• <b>Ctrl/Cmd</b>+drag to rotate a keyframe knot control handles.</li> </ul> <div>  <b>Note:</b> The curve must pass through 0,0 and 1,1 so that the in and out points work, respectively. </div> |
| reset        | N/A              | N/A           | Click to reset the curve to the default values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

# SmartVector

The SmartVector node writes motion vectors to the **.exr** format, which are then used to drive the VectorDistort or VectorCornerPin nodes as part of the Smart Vector toolset.

See [VectorDistort](#) and [VectorCornerPin](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inputs          | Matte           | An optional matte of the foreground, which may improve the motion estimation by reducing the dragging of pixels that can occur between foreground and background objects. |
|                 | Source          | The sequence from which to generate motion vectors.                                                                                                                       |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SmartVector Tab      |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available.<br/> You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div>                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Vector Detail | vectorDetailReg  | 0.3           | <p>Sets the vector quality. The default value of 0.3 is sufficient for sequences with low detail and movement, but you may want to increase the detail to improve the vector quality in some cases.</p> <div>  <b>Note:</b> High detail vectors take longer to render, but can improve the results you get from the VectorDistort node. </div>                                                                                                |
| Strength      | strengthReg      | 1.5           | <p>Sets the strength in matching pixels between frames. Higher values allow you to accurately match similar pixels in one frame to another, concentrating on detail matching even if the resulting motion field is jagged. Lower values may miss local detail, but are less likely to provide you with the odd spurious vector, producing smoother results.</p> <div>  <b>Note:</b> The default value works well for most sequences. </div> |
| Matte Channel | matteChannel     | None          | <p>Where to get the optional foreground mask to use when estimating motion:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the Source input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the Source input.</li> <li>• <b>Matte Luminance</b> - use the luminance of the</li> </ul>                                                                                                                                   |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <p>Matte input.</p> <ul style="list-style-type: none"> <li>• <b>Matte Inverted Luminance</b> - use the inverted luminance of the Matte input.</li> <li>• <b>Matte Alpha</b> - use the alpha of the Matte input.</li> <li>• <b>Matte Inverted Alpha</b> - use the inverted alpha of the Matte input.</li> </ul>                                           |
| Output               | output           | Background    | When <b>Matte Channel</b> is set to anything other than <b>None</b> , the <b>Output</b> control determines whether <b>Foreground</b> or <b>Background</b> vectors are passed down stream or written to file.                                                                                                                                             |
| Inpaint Matte Region | inpainting       | disabled      | <p>When enabled, any areas where vectors are absent are infilled using the nearest available vectors.</p> <div>  <b>Note:</b> This control is only available when <b>Matte Channel</b> is set to one of the matte options, such as <b>Matte Alpha</b>.         </div> |
| Matte Dilation       | matteDilation    | 50            | <p>Controls the amount of dilation applied to the matte before inpainting the matte region.</p> <div>  <b>Note:</b> This control is only available when <b>Inpaint Matte Region</b> is enabled.         </div>                                                        |
| Export               |                  |               |                                                                                                                                                                                                                                                                                                                                                          |
| Export Write         | export_write     | N/A           | Click to automatically create a Write node with suitable <b>.exr</b> settings to contain the vector data.                                                                                                                                                                                                                                                |
| Advanced             |                  |               |                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)         | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flicker Compensation | flickerCompensation | disabled      | <p>When enabled, SmartVector takes into account variations in luminance and overall flickering, which can cause problems with your output. Examples of variable luminance include highlights on metal surfaces, like vehicle bodies, or bodies of water within a layer that reflect light in unpredictable ways.</p> <div>  <b>Note:</b> Using <b>Flicker Compensation</b> increases rendering time. </div> |
| Tolerances           |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Weight Red           | weightRed           | 0.3           | <p>For efficiency, much of the motion estimation is done on luminance only - that is, using monochrome images. The tolerances allow you to tune the weight of each color channel when calculating the image luminance. These parameters rarely need tuning. However, you may, for example, wish to increase the <b>Weight Red</b> to allow the algorithm to concentrate on getting the motion of a primarily red object correct, at the cost of the rest of the items in a shot.</p>         |
| Weight Green         | weightGreen         | 0.6           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Weight Blue          | weightBlue          | 0.1           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

# TemporalMedian

This node applies a temporal median filter to the input clip. It outputs each pixel by calculating the median of the current frame, the frame before, and the frame after. This can be useful for removing grain, for example.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to apply a temporal median filter to (typically, the image sequence to degrain).                                                                                                                                                                                                                                                                                            |
|                 | mask            | <p>An optional image to use as a mask. By default, the temporal median filter effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                            |
|--------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TemporalMedian Tab |                  |               |                                                                                                                                                                                                                                                     |
| channels           | channels         | all           | <p>The temporal median filter effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                        |
| core               | core             | 0.05          | If the differences between pixel values on the current, previous, and next frame are greater than this value, those pixels are left unchanged. This is because higher differences between frames probably indicate something other than film grain. |
| mask               | N/A              | disabled      | Enable the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                        |
|                    | maskChannelInput | none          | The channel to use as a mask. By default, the temporal median filter effect is limited to the non-black areas of this channel.                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the temporal median filter effect is limited to the non-white areas of the mask.                 |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                 |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                          |

# TimeBlur

When a fast moving subject is recorded on film or video, its edges appear to smear as a result of the object's movement while the shutter is open. The longer the shutter remains open at each frame interval, the more obvious this effect. TimeBlur simulates this phenomenon by sampling its input at **divisions** times over **shutter** frames starting at the current frame plus **offset**.

Time blur is commonly applied to garbage masks that are tracked to a fast moving feature. The time blur averages the incoming mask image over the shutter period, to better match the motion blur in the original image and creating a more convincing integration.

See also [NoTimeBlur](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply blur. |



| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeBlur Tab   |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| divisions      | divisions           | 10            | The number of times you want to sample the input over the shutter time. For images with fast-moving content, higher values are necessary to eliminate "steppiness" or banding in the output.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| shutter        | shutter             | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| shutter offset | shutteroffset       | start         | <p>Controls how the shutter behaves with respect to the current frame value:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# TimeClip

Just like TimeOffset, the TimeClip node lets you move the clip forwards or backwards in time and reverse the order of frames in the clip.

In addition to this basic functionality, you can slip a clip, set the frame range for the clip, set what happens to frames outside of this frame range, fade the clip to or from black, and set expressions to adjust the node's behavior.

**Tip:** Using TimeClip, you can also offset, trim, and slip clips directly in the Dope Sheet. See Nuke's [online help](#) for more information.

See also [TimeOffset](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                    |
|-----------------|-----------------|-----------------------------|
| Input           | unnamed         | The image sequence to slip. |

| Control (UI) | Knob (Scripting) | Default Value                        | Function                                                                                                                                                 |
|--------------|------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeClip Tab |                  |                                      |                                                                                                                                                          |
| Fade In      | fadeIn           | 5                                    | The number of frames to fade from black.                                                                                                                 |
| Fade Out     | fadeOut          | 5                                    | The number of frames to fade to black.                                                                                                                   |
| frame range  | first            | Dependent on <b>Project Settings</b> | The first frame of the range.<br><br>You can also adjust this by going to the <b>Dope Sheet</b> tab and dragging the head of the clip to a new location. |
|              | before           | hold                                 | Sets the behavior of frames before the <b>first</b> frame                                                                                                |



| Control (UI) | Knob (Scripting) | Default Value                        | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                                      | <p>(examples refer to a 20-frame sequence with a <b>first</b> value of 5):</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - the first frame in the sequence is held until the <b>first</b> frame is reached. Example: 1, 1, 1, 1, 1, 2, 3, 4, etc.</li> <li>• <b>loop</b> - substitutes an equal number of frames, effectively creating a clip loop. Example: 17, 18, 19, 20, 1, 2, 3, 4, etc.</li> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce. Example: 5, 4, 3, 2, 1, 2, 3, 4, etc.</li> <li>• <b>black</b> - frames are black until the <b>first</b> frame is reached.</li> </ul>                                                                                                     |
|              | last             | Dependent on <b>Project Settings</b> | <p>The last frame of range.</p> <p>You can also adjust this by going to the <b>Dope Sheet</b> tab and dragging the tail of the clip to a new location.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|              | after            | hold                                 | <p>Sets the behavior of frames after the <b>last</b> frame (examples refer to a 20 frame sequence with a <b>last</b> value of 5):</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - the <b>last</b> frame in the sequence is held until the end of the sequence is reached. Example: 16, 17, 18, 19, 20, 20, 20, 20, etc.</li> <li>• <b>loop</b> - substitutes an equal number of frames, effectively creating a clip loop. Example: 16, 17, 18, 19, 20, 1, 2, 3, 4, etc.</li> <li>• <b>bounce</b> - substitutes a reversed equal number of frames, creating a clip bounce. Example: 16, 17, 18, 19, 20, 19, 18, 17, etc.</li> <li>• <b>black</b> - frames are black from <b>last</b> until the end of the sequence is reached.</li> </ul> |
| frame        | frame_mode       | expression                           | <p>Sets the frame mode:</p> <ul style="list-style-type: none"> <li>• <b>expression</b> - Lets you enter an expression in the field on the right. The expression changes the relation between the current frame and the frame read in. For example, if your clip begins from image.0500.rgb and you want to</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>place this first frame at frame 1 rather than frame 500, you can use the expression <b>frame+499</b>. This way, 499 frames are added to the current frame to get the number of the frame that's read in. At frame 1, image.0500.rgb is read in; at frame 2, image.0501.rgb is read in; and so on. Another example of an expression is <b>frame*2</b>. This expression multiplies the current frame by two to get the number of the frame that's read in. This way, only every other frame in the clip is used. At frame 1, image.0002.rgb is read in; at frame 2, image.0004.rgb is read in; at frame 3, image.0006.rgb is read in; and so on.</p> <ul style="list-style-type: none"> <li>• <b>start at</b> - Lets you enter a start frame number in the field on the right. This specifies the frame where the first frame in the sequence is read in. In other words, all frames are offset so that the clip starts at the specified frame. For example, if your sequence begins from image.0500.rgb and you enter <b>1</b> in the field, image.0500.rgb is read in at frame 1. Similarly, if you enter <b>100</b> in the field, image.0500.rgb is read in at frame 100.</li> <li>• <b>offset</b> - Lets you enter a constant offset in the field on the right. This constant value is added to the current frame to get the number of the frame that's read in. For example, if your clip begins from image.0500.rgb and you want to place this first frame at frame 1 rather than frame 500, you can use <b>499</b> as the constant offset. This way, 499 is added to the current frame to get the frame that's read in. At frame 1, image.0500.rgb is read in; at frame 2, image.0501 is read in, and so on. You can also use negative values as the constant offset. For example, if you use the value <b>-10</b>, Nuke subtracts ten from the current frame to get the frame that's read in. At frame 20, image.0010.rgb is read in; at frame 21, image.0011.rgb is read in; and so on.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value                        | Function                                                   |
|----------------|------------------|--------------------------------------|------------------------------------------------------------|
| original range | origfirst        | Dependent on <b>Project Settings</b> | The original first frame of the sequence.                  |
|                | origlast         | Dependent on <b>Project Settings</b> | The original last frame of the sequence.                   |
| reverse        | reverse          | disabled                             | Reverse the clip within the specified <b>frame range</b> . |

# TimeEcho

Merges multiple frames from the input into a single frame to create an echo-like effect over time. This allows you to create streaking and smearing effects, for example.

## Inputs and Controls

| Connection Type | Connection Name | Function                                     |
|-----------------|-----------------|----------------------------------------------|
| Input           | unnamed         | The image sequence with the frames to merge. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                 |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeEcho Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                          |
| TimeEcho Method | mode             | max           | Sets how the frames are blended together: <ul style="list-style-type: none"> <li>• <b>Plus</b> - uses the sum of all frames. Note that this may result in pixel values higher than 1.0.</li> <li>• <b>Max</b> - uses the highest value from the frames.</li> <li>• <b>Average</b> - averages the frames (uses the sum divided</li> </ul> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |               | by the number of frames). The result is darker than the original images.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Frames to look at  | framesbehind     | 1             | <p>Sets the number of frames to merge together, counting backwards from the current frame (and including the current frame).</p> <p>For example, if the current frame is 10, and you set this value to 4, TimeEcho merges frames 7, 8, 9, and 10.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Frames to fade out | framesfade       | 1             | <p>Allows you to fade out frames, so that the further back a frame is in time, the less effect it has on the final images. Note that this is the total number of frames over which the fade happens, with the last of these frames remaining at maximum.</p> <p>For example, if you set this to 5, the fade will gradually happen over the first five frames used, with the fifth frame remaining at maximum:</p> <ul style="list-style-type: none"> <li>• the first image is reduced to 20% of its original opacity</li> <li>• the second image is reduced to 40% of its original opacity</li> <li>• the third image is reduced to 60% of its original opacity</li> <li>• the fourth image is reduced to 80% of its original opacity</li> <li>• the fifth image remains at 100% of its original opacity.</li> </ul> |

# TimeOffset

Lets you *offset* a clip. Offsetting a clip refers to moving it backward or forward in time. There are any number of reasons why you might want to do this (for example, to synchronize events in a background and foreground clip).

After offsetting the clip, you may want to adjust the script length for the new output range. Press **S** on the Node Graph to open the **Project Settings**, and enter frame range values that match the output range you specified. If you don't do this, Nuke fills the empty frames at the head or tail of the clip by holding the first or last frame.



**Tip:** Using TimeOffset, you can also offset clips directly in the Dope Sheet. See Nuke's [online help](#) for more information.

## Inputs and Controls

| Connection Type | Connection Name | Function                      |
|-----------------|-----------------|-------------------------------|
| Input           | unnamed         | The image sequence to offset. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                    |
|----------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeOffset Tab       |                  |               |                                                                                                                                                                                                             |
| time offset (frames) | time_offset      | 0             | <p>The number of frames by which you want to offset the clip.</p> <p>Enter a negative value to subtract frames from the head of the clip. Enter a positive value to add frames to the head of the clip.</p> |
| reverse input        | reverse_input    | disabled      | When enabled, TimeOffset inverts the clip (making the last frame the first, and so on).                                                                                                                     |

## TimeWarp

Lets you slow down, speed up, or even reverse selected frames in a clip without necessarily altering its overall length.

See also [OFlow](#), [Retime](#), and [Kronos](#).

## Inputs and Controls

| Connection Type | Connection Name | Function              |
|-----------------|-----------------|-----------------------|
| Input           | unnamed         | The sequence to warp. |


**Note:** When you connect the TimeWarp node, frame 1 is automatically keyframed as the first frame.

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeWarp Tab |                  |               |                                                                                                                                                                                                                                                                                                                            |
| input frame  | lookup           | 1             | <p>Sets which frame of the input sequence appears at the current frame.</p> <p>For example, you could set frame 10 of the input to output at frame 5, effectively doubling the speed of the sequence.</p>                                                                                                                  |
| curve editor | N/A              | N/A           | Click to open up the Curve Editor.                                                                                                                                                                                                                                                                                         |
| input length | length           | 1             | <p>Sets the length of time to average together to produce the output frame.</p> <p>Click the <b>set to df/dt</b> button to automatically set the <b>inputlength</b> to the correct formula based on the derivative of the <b>inputframe</b>.</p>                                                                           |
| set to df/dt | N/A              | N/A           | Click to automatically set the <b>inputlength</b> to the correct formula based on the derivative of the <b>inputframe</b> .                                                                                                                                                                                                |
| filter       | filter           | box           | <p>Sets the type of filtering to apply to the time warp:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - passes fractional frame numbers to the input, which is useful if the input can calculate its own frame interpolation.</li> <li>• <b>nearest</b> - rounds the center of the range to nearest</li> </ul> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>integer frame.</p> <ul style="list-style-type: none"> <li>• <b>box</b> - uses a weighted average of several frames together to cover the output range.</li> </ul> |

# VectorGenerator

VectorGenerator (NukeX and Nuke Studio only) produces images containing motion vector fields. In general, once you have generated a sequence of motion vector fields that describe the motion in a particular clip well, they will be suitable for use in any nodes which can take vector inputs. These include [Kronos](#) and [MotionBlur](#) available in NukeX.

The output from VectorGenerator consists of two sets of motion vectors for each frame. These are stored in the vector channels.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Matte           | <p>An optional matte of the foreground, which may improve the motion estimation by reducing the dragging of pixels that can occur between foreground and background objects.</p> <p>An optional matte of the foreground. This can be used to help the motion estimation algorithm inside VectorGenerator understand what is foreground and background in the image, so that the dragging of pixels between overlapping objects can be reduced. White areas of the matte are considered to be foreground, and black areas background. Grey areas are used to attenuate between foreground and background.</p> |
|                 | Source          | The sequence from which to generate motion vectors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VectorGenerator Tab  |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available.<br/> You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div>                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)  | Knob (Scripting) | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |                     | See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Method        | motionEstimation | Dependent on script | <p>Sets the method of calculating motion estimation vectors:</p> <ul style="list-style-type: none"> <li>• <b>Local</b> - uses local block matching to estimate motion vectors. This method is faster to process, but can lead to artifacts in the output.</li> <li>• <b>Regularized</b> - uses semi-global motion estimation to produce more consistent vectors between regions.</li> </ul> <div>  <p><b>Note:</b> Scripts loaded from previous versions of Nuke default to <b>Local</b> motion estimation for backward compatibility. Adding a new VectorGenerator node to the Node Graph defaults the <b>Method</b> to <b>Regularized</b> motion estimation.</p> </div> |
| Vector Detail | vectorDetail     | 0.3                 | This determines the resolution of the vector field. The larger vector detail is, the greater the processing time, but the more detailed the vectors should be. A value of 1.0 generates a vector at each pixel. A value of 0.5 generates a vector at every other pixel. For some sequences, a high vector detail near 1.0 generates too much unwanted local motion detail, and often a low value is more appropriate.                                                                                                                                                                                                                                                                                                                                      |
| Strength      | strength         | 1.5                 | <p>This control is only active if <b>Method</b> is set to <b>Regularized</b>.</p> <p>Sets the strength in matching pixels between frames. Higher values allow you to accurately</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>match similar pixels in one image to another, concentrating on detail matching even if the resulting motion field is jagged. Lower values may miss local detail, but are less likely to provide you with the odd spurious vector, producing smoother results.</p> <div>  <b>Note:</b> The default value should work well for most sequences.         </div>                                                                                                                                                          |
| Smoothness    | smoothness       | 0.5           | <p>This control is only active if <b>Method</b> is set to <b>Local</b>.</p> <p>A high smoothness can miss lots of local detail, but is less likely to provide you with the odd spurious vector, whereas a low smoothness concentrates on detail matching, even if the resulting field is jagged.</p> <div>  <b>Note:</b> The default value should work well for most sequences.         </div>                                                                                                                        |
| Matte Channel | matteChannel     | None          | <p>Where to get the (optional) foreground mask to use for motion estimation:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the <b>Source</b> input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the <b>Source</b> input.</li> <li>• <b>Mask Luminance</b> - use the luminance of the <b>Matte</b> input.</li> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the <b>Matte</b> input.</li> <li>• <b>Mask Alpha</b> - use the alpha of the <b>Matte</b> input.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Mask Inverted Alpha</b> - use the inverted alpha of the <b>Matte</b> input.</li> </ul>                                                                                                                                                                                                                                 |
| Output       | output           | Foreground    | <p>When a matte input is supplied, this determines whether the motion vectors corresponding to the background or the foreground regions are output.</p> <ul style="list-style-type: none"> <li>• <b>Foreground</b> - the vectors for the foreground motion are output.</li> <li>• <b>Background</b> - the vectors for the background motion are output.</li> </ul> |

## Advanced

|                      |                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|---------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flicker Compensation | flickerCompensation | disabled | <p>When enabled, VectorGenerator takes into account variations in luminance and overall flickering, which can cause problems with your output.</p> <p>Examples of variable luminance include highlights on metal surfaces, like vehicle bodies, or bodies of water within a layer that reflect light in unpredictable ways.</p> <div>  <b>Note:</b> Using <b>Flicker Compensation</b> increases rendering time. </div> |
|----------------------|---------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Advanced &gt; Tolerances

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weight Red   | weightRed        | 0.3           | For efficiency, much of the motion estimation is done on luminance only - that is, using monochrome images. The tolerances allow you to tune the weight of each color channel when calculating the image luminance. These parameters rarely need tuning. However, you may, for example, wish to increase the red weighting <b>Weight Red</b> to allow the algorithm to concentrate on getting the motion of a primarily red object correct, at the cost of the rest of the items in a shot. |
| Weight Green | weightGreen      | 0.6           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weight Blue  | weightBlue       | 0.1           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

# VectorToMotion

VectorToMotion converts SmartVectors to **motion**, **forward**, and **backward** channels that can be used with VectorBlur to create motion blur, without using a VectorGenerator.

It doesn't have any controls of its own, it's a conversion tool to convert vectors to motion channels. See Nuke's [online help](#) for more information.

# Channel Nodes

Channel nodes deal with the use of channels and layers within your composite. Typical channels are red, green, blue, and alpha - however, there are many other pieces of useful data that can be stored in unique channels. A layer is simply a collection of channels, for example rgba.

## AddChannels

Adds channels to the input image. Channels that do not already exist are created and filled with the color defined by the **color** knob.

### Inputs and Controls

| Connection Type | Connection Name | Function                                       |
|-----------------|-----------------|------------------------------------------------|
| Input           | unnamed         | The image to which the new channels are added. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AddChannels Tab |                  |               |                                                                                                                                                                               |
| channels        | channels         | none          | The channels to add.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.        |
| and             | channels2        | none          | Additional channels to add.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| and          | channels3        | none          | Additional channels to add.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                   |
| and          | channels4        | none          | Additional channels to add.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                   |
| color        | color            | 0             | The default color to fill in any new channels - existing channels are not changed.<br><br><div>  <b>Note:</b> The current version only accepts rgba and gray shades for other channels. </div> |

# ChannelMerge

The ChannelMerge node lets you merge together one channel from each input and save the result in the selected **output channel**. All other channels are copied unchanged from the **B** input.

If no **A** input is connected, both channels to merge are taken from the **B** input.

By default, ChannelMerge combines the inputs' alphas.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------|
| Input           | A               | The image that contains a channel to merge with a channel from input <b>B</b> . This input is optional. |



| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | B               | The image that contains a channel to merge with a channel from input <b>A</b> . If no <b>A</b> input is connected, both channels to merge are taken from this input.                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the merge is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ChannelMerge Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| A channel        | N/A              | enabled       | Enables the associated A channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                  | A                | rgba.alpha    | The channel to merge from input <b>A</b> . If no <b>A</b> input is connected, this channel is taken from input <b>B</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| operation        | operation        | union         | <p>Sets how the pixel values from input <b>A</b> are calculated with the pixel values from input <b>B</b> to create the new pixel values that are output as the merged image:</p> <ul style="list-style-type: none"> <li>• <b>absminus</b> <math>\text{abs}(A-B)</math> - how much the pixels differ.</li> <li>• <b>b if not a</b> <math>A?A:B</math> - shows A wherever A exists; otherwise shows B.</li> <li>• <b>divide</b> <math>A/B</math>, 0 if <math>A &lt; 0</math> and <math>B &lt; 0</math> - divides the values but stops two negative values from becoming a positive number.</li> <li>• <b>from</b> <math>(B-A)</math> - subtracts A from B.</li> <li>• <b>in</b> <math>A \&amp; B</math> - only shows the areas of image A that overlap with the alpha of B.</li> <li>• <b>max</b> <math>(\max(A,B))</math> - selects the lighter of the two colors as the resulting color. Only areas darker than</li> </ul> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>B are replaced, while areas lighter than B do not change.</p> <ul style="list-style-type: none"> <li>• <b>min</b> (min(A,B)) - selects the darker of the two colors as the resulting color. Any parts that are lighter than B are substituted. Any parts of the image that are darker than B don't change.</li> <li>• <b>minus</b> (A-B) - subtracts B from A.</li> <li>• <b>multiply</b> (AB, A if A&lt;0 and B&lt;0) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged.</li> <li>• <b>out</b> A(1-b) - only shows the areas of image A that do not overlap with the alpha of B.</li> <li>• <b>plus</b> A+B - the sum of the two colors. Increases brightness to lighten A and reflect B.</li> <li>• <b>stencil</b> B(1-a) - this is the reverse of the out operation. Only shows the areas of image B that do not overlap with the alpha of A.</li> <li>• <b>union</b> A+B-AB - shows both image A and B.</li> <li>• <b>xor</b> A+B-2AB - shows both image A and B where the images do not overlap.</li> </ul> |
| B channel    | N/A              | enabled       | Enables the associated B channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|              | B                | rgba.alpha    | The channel to merge from input <b>B</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| output       | N/A              | enabled       | Enables the associated output channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|              | output           | rgba.alpha    | Render the merged image into this output channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Set BBox to  | bbox             | union         | <p>How to output the bounding box:</p> <ul style="list-style-type: none"> <li>• <b>union</b> - combine the two bounding boxes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>B side</b> - use the bounding box from input <b>B</b>. Any data from the <b>A</b> input that's outside this box is clipped.</li> <li>• <b>A side</b> - use the bounding box from input <b>A</b>. Any data from the <b>B</b> input that's outside this box is clipped.</li> </ul> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the merge is limited to the non-black areas of this channel.                                                                                                                                                                                                                       |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                 |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the merge is limited to the non-white areas of the mask.                                                                                                                                                                                                                         |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                     |
| mix          | mix              | 1             | Dissolves between the original B input at 0 and the full merge effect at 1.                                                                                                                                                                                                                                                  |

# Copy

Replaces channels in the **B** input with channels from the **A** input. You can use a mask channel to indicate which input is used for each pixel or whether both inputs should be mixed for some pixels.

Using the **mix** slider, you can use this node as a dissolve. You can also create this node by pressing **K** on the Node Graph.

See also [Shuffle](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The image that contains a channel to copy to input <b>B</b> .                                                                                                                                                                                                                                                                                                                                                                                                        |
|                 | B               | The image that contains a channel to replace with a channel from the <b>A</b> input.                                                                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the <b>A</b> input is used where the mask is white, the <b>B</b> input where the mask is black, and a blend between the inputs where the mask is gray.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|
| Copy Tab     |                  |               |                                                                                                                          |
| Copy channel | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|              | from0            | rgba.alpha    | A channel to copy from input <b>A</b> .                                                                                  |
| to           | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|              | to0              | rgba.alpha    | The channel that the above <b>Copy channel</b> replaces in input <b>B</b> .                                              |
| Copy channel | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|              | from1            | rgba.alpha    | Another channel to copy from input <b>A</b> .                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| to           | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                 |
|              | to1              | rgba.alpha    | The channel that the above <b>Copy channel</b> replaces in input <b>B</b> .                                                                                                                                                                                                                                                                              |
| Copy channel | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                 |
|              | from2            | rgba.alpha    | Another channel to copy from input <b>A</b> .                                                                                                                                                                                                                                                                                                            |
| to           | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                 |
|              | to2              | rgba.alpha    | The channel that the above <b>Copy channel</b> replaces in input <b>B</b> .                                                                                                                                                                                                                                                                              |
| Copy channel | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                 |
|              | from3            | rgba.alpha    | Another channel to copy from input <b>A</b> .                                                                                                                                                                                                                                                                                                            |
| to           | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                 |
|              | to3              | rgba.alpha    | The channel that the above <b>Copy channel</b> replaces in input <b>B</b> .                                                                                                                                                                                                                                                                              |
| Layer Copy   | channels         | none          | <p>Copies all the selected channels from <b>A</b> to <b>B</b>, if they exist in <b>A</b>. If they don't exist in <b>A</b>, the channels from <b>B</b> are used unchanged.</p> <p>This allows you to easily copy multiple channels from <b>A</b> to <b>B</b>. For example, setting this to <b>all</b> copies all the channels that exist in <b>A</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                                                    |
| Set BBox to   | bbox             | union         | <p>How to output the bounding box:</p> <ul style="list-style-type: none"> <li>• <b>union</b> - combine the two bounding boxes.</li> <li>• <b>B side</b> - use the bounding box from input <b>B</b>. Any data from the <b>A</b> input that's outside this box is clipped.</li> <li>• <b>A side</b> - use the bounding box from input <b>A</b>. Any data from the <b>B</b> input that's outside this box is clipped.</li> </ul> |
| metadata from | metainput        | B             | <p>Sets the source of the metadata passed down the node tree:</p> <ul style="list-style-type: none"> <li>• <b>B</b> - only input B metadata is preserved.</li> <li>• <b>A</b> - only input A metadata is preserved.</li> <li>• <b>All</b> - both input A and B metadata is preserved.</li> </ul>                                                                                                                              |
| range from    | rangeinput       | B             | <p>Sets the output frame range passed down the node tree:</p> <ul style="list-style-type: none"> <li>• <b>B</b> - only frames from input B are output.</li> <li>• <b>A</b> - only frames from input A are output.</li> <li>• <b>All</b> - both input A and B frames are output.</li> </ul>                                                                                                                                    |
| mask          | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                 |
|               | maskChannelInput | none          | The channel to use as a mask. By default, the <b>A</b> input is used where the mask is white, the <b>B</b> input where the mask is black, and a blend between the inputs where the mask is gray.                                                                                                                                                                                                                              |
| inject        | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the                                                                                                                                                                                                                                                                                                                |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the <b>B</b> input is used where the mask is white and the <b>A</b> input where the mask is black.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the copy before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one Copy node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mix            | mix              | 1             | Dissolves between the original B input at 0 and the full copy effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

# Remove

Removes channels from the input clip. When you are done using a layer or a channel within a set, you may wish, for the sake of clarity, to remove it so that it is no longer passed to downstream nodes. Note that leaving channels in the stream will not itself cause them to be computed; only channels required are computed.

Removing layers and or channels does not free up space for the creation of new channels and layers. Once you create a channel, it permanently consumes one of the script's 1023 available channel name slots. You are free, however, to rename channels and/or assign them new outputs.

## Inputs and Controls

| Connection Type | Connection Name | Function                                    |
|-----------------|-----------------|---------------------------------------------|
| Input           | unnamed         | The image sequence with channels to remove. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remove Tab   |                  |               |                                                                                                                                                                                                                                           |
| operation    | operation        | remove        | Sets how channels are removed: <ul style="list-style-type: none"> <li>• <b>remove</b> - removes the channels you select below.</li> <li>• <b>keep</b> - keeps the channels you select below and removes all other channels.</li> </ul>    |
| channels     | channels         | all           | The channels to remove (or keep if you've set <b>operation</b> to <b>keep</b> ).<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.        |
| and          | channels2        | none          | Additional channels to remove (or keep if you've set <b>operation</b> to <b>keep</b> ).<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| and          | channels3        | none          | Additional channels to remove (or keep if you've set                                                                                                                                                                                      |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p><b>operation to keep).</b></p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                      |
| and          | channels4        | none          | <p>Additional channels to remove (or keep if you've set <b>operation to keep).</b></p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |

# Shuffle



**Note:** Nuke 12.1 introduced a new and improved Shuffle2 node, which makes Shuffle and ShuffleCopy obsolete. Shuffle and ShuffleCopy are still available for backward compatibility if you press **X** in the Node Graph and enter **Shuffle** or **ShuffleCopy**.

Shuffle lets you:

- rearrange up to 8 channels from a single image (B input). For example, you can use it to swap rgba.red for rgba.green, and vice versa,
- rearrange channels between two separate nodes (A and B input), like a foreground and background branch,
- replace a channel with black (removing the alpha channel, for example) or with white (making the alpha solid, for example),
- create new channels.

To simply copy a channel from one data stream into another, see [Copy](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                     |
|-----------------|-----------------|--------------------------------------------------------------|
| Input           | B               | The primary image sequence with the channels to rearrange.   |
|                 | A               | The secondary image sequence with the channels to rearrange. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                       |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Shuffle Tab  |                  |               |                                                                                                                                                |
| Input Layer  |                  |               |                                                                                                                                                |
| In           | fromInput1       | B             | The incoming layer(s) that contains the channel(s) to rearrange.                                                                               |
|              | in1              | rgba          | You can also select <b>new</b> here to create new channels.                                                                                    |
| In           | fromInput2       | B             | Additional incoming channels to rearrange. If you only want to rearrange channels from one layer, you don't need these controls.               |
|              | in2              | none          | You can also select <b>new</b> here to create new channels.                                                                                    |
| Output Layer |                  |               |                                                                                                                                                |
| N/A          | out1             | rgba          | The rearranged channels are output to this layer.                                                                                              |
|              |                  |               | You can also select <b>new</b> here to create new channels.                                                                                    |
| N/A          | out2             | none          | Additional rearranged channels are output to this layer. If you only want to rearrange channels from one layer, you don't need these controls. |
|              |                  |               | You can also select <b>new</b> here to create new channels.                                                                                    |

# ShuffleCopy



**Note:** Nuke 12.1 introduced a new and improved Shuffle2 node, which makes Shuffle and ShuffleCopy obsolete. Shuffle and ShuffleCopy are still available for backward compatibility if you press **X** in the Node Graph and enter **Shuffle** or **ShuffleCopy**.

ShuffleCopy lets you:

- rearrange up to 8 channels from two images (two inputs). For example, you can use it to combine two separate passes (such as the beauty pass and the reflection pass) into the same data stream,
- replace the alpha with black (removing the alpha channel) or with white (making the alpha solid),
- create new channels.

Channels not affected by this node are taken from input 2, which is considered the main data stream.

To rearrange channels in a single upstream node, [Shuffle](#).

To simply copy a channel from one data stream into another, see [Copy](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
| Input           | 1               | The first image sequence with the channels to rearrange.                                                                         |
|                 | 2               | The second image sequence with the channels to rearrange. Any channels not affected by this node are also taken from this input. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                            |
|-----------------|------------------|---------------|-----------------------------------------------------|
| ShuffleCopy Tab |                  |               |                                                     |
| 1 in            | in               | rgba          | Channels supplied by input 1. If you check a column |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                            |
|------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | below, that channel is taken from this input, and gets output to the channel indicated by the row.                                                                                                                                                                                  |
| 2 in                         | in2              | rgba          | Channels supplied by input 2. If you check a column below, that channel is taken from this input, and gets output to the channel indicated by the row.                                                                                                                              |
| [top right dropdown menu]    | out              | rgba          | The rearranged channels are output to this layer.                                                                                                                                                                                                                                   |
| [bottom right dropdown menu] | out2             | none          | <p>The second set of outputs from the node. This allows you to output another four rearranged channels from the node, for a total of eight channels of output to match the possible eight channels of input.</p> <p>You can also select <b>new</b> here to create new channels.</p> |

# Color Nodes

Color nodes deal with color corrections, color space, and color management.

## Add

The Add node lets you *offset* a channel's values. It adds a fixed value to the channel, which, in effect, lightens the whole channel. You can also add a negative value to a channel, in which case the channel gets darker.

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to offset.                                                                                                                                                                                                                                                                                                                                           |
|                 | mask            | <p>An optional image to use as a mask. By default, the offset is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                      |
|--------------|------------------|---------------|-----------------------------------------------|
| Add Tab      |                  |               |                                               |
| channels     | channels         | all           | The offset is only applied to these channels. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                                                                              |
| value          | value            | 0             | The value to add to the channels selected above. A positive value lightens the selected channels, and a negative value darkens them.                                                                                                                                                                                                                                                                                                                    |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                           |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the offset is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                 |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the offset is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                   |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                                                                                                                                            |
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the addition before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                      |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full offset effect at 1.                                                           |

# Clamp

This node constrains, or clamps, values in the selected channels to a specified range. By default, it clamps all channels to values between 0 and 1. This can be useful for ensuring that the input's blackest blacks and whitest whites will be visible on an intended display device, or for restricting data fed to a subsequent node that does not support numbers outside this range.

See also [ClipTest](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose values you want to clamp.                                                                                                                                                                                                                                                                                                                     |
|                 | mask            | <p>An optional image to use as a mask. By default, the clamp is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clamp Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| channels     | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                        |
| minimum      | minimum          | 0             | <p>The lower clamp value. By default, all values that are lower than this number are set to this value. For example, if you set this to 0.2, any value below 0.2 is set to 0.2. This has the effect of causing black values to go gray.</p> <p>However, if you check <b>enabled</b> next to <b>MinClampTo</b>, all values that are lower than this number are set to the <b>MinClampTo</b> value. For example, if you set this to 0.2 and <b>MinClampTo</b> to 0.4, any value below 0.2 is set to 0.4.</p>   |
|              | minimum_enable   | enabled       | Whether to clamp selected channels to a minimum value. Disabling both <b>minimum</b> and <b>maximum</b> effectively disables the node.                                                                                                                                                                                                                                                                                                                                                                       |
| maximum      | maximum          | 1             | <p>The upper clamp value. By default, all values that are higher than this number are set to this value. For example, if you set this to 0.8, any value above 0.8 is set to 0.8. This has the effect of causing white values to go gray.</p> <p>However, if you check <b>enabled</b> next to <b>MinClampTo</b>, all values that are higher than this number are set to the <b>MaxClampTo</b> value. For example, if you set this to 0.8 and <b>MinClampTo</b> to 0.6, any value above 0.8 is set to 0.6.</p> |
|              | maximum_enable   | enabled       | Whether to clamp selected channels to a maximum value. Disabling both <b>minimum</b> and <b>maximum</b> effectively disables the node.                                                                                                                                                                                                                                                                                                                                                                       |



| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                    |
|--------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MinClampTo   | MinClampTo        | 0             | The value to which low illegal values are clamped when <b>MinClampTo</b> is enabled. This sets the clamped areas to a custom color, allowing you to visualize the clamped range or create graphic effects.  |
|              | MinClampTo_enable | disabled      | <p>When enabled, all values below <b>minimum</b> are clamped to the <b>MinClampTo</b> value.</p> <p>When disabled, all values below <b>minimum</b> are clamped to the <b>minimum</b> value.</p>             |
| MaxClampTo   | MaxClampTo        | 1             | The value to which high illegal values are clamped when <b>MaxClampTo</b> is enabled. This sets the clamped areas to a custom color, allowing you to visualize the clamped range or create graphic effects. |
|              | MaxClampTo_enable | disabled      | <p>When enabled, all values above <b>maximum</b> are clamped to the <b>MaxClampTo</b> value.</p> <p>When disabled, all values above <b>maximum</b> are clamped to the <b>maximum</b> value.</p>             |
| mask         | N/A               | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                               |
|              | maskChannelInput  | none          | The channel to use as a mask. By default, the clamp is limited to the non-black areas of this channel.                                                                                                      |
| inject       | inject            | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                |
| invert       | invert_mask       | disabled      | Inverts the use of the mask channel so that the clamp is limited to the non-white areas of the mask.                                                                                                        |
| fringe       | fringe            | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                         |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the clamp before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full clamp effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# ClipTest

ClipTest applies zebra stripes to all pixels outside a specified range. This can help you ensure that the input's blackest blacks and whitest whites are visible on an intended display device. By default, ClipTest highlights any pixels that are outside the range from 0 to 1.



**Note:** This node affects the final output and not just the Viewer.

See also [Clamp](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose out-of-range pixels you want to highlight.                                                                                                                                                                                                                                                                                                             |
|                 | mask            | <p>An optional image to use as a mask. By default, the zebra stripes are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| ClipTest Tab |                  |               |                                                                                                                                              |
| channels     | channels         | rgba          | <p>The zebra stripes are only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>   |
| lower        | lower            | 0             | Highlight any pixels whose values are lower than this number.                                                                                |
| upper        | upper            | 1             | Highlight any pixels whose values are higher than this number.                                                                               |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the zebra stripes are limited to the non-black areas of this channel.                              |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the zebra stripes are limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the clip test before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full clip test effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# CMSTestPattern

This node generates calibration patterns for color management. You should run the output of this node through a color management node and then render the result with a GenerateLUT node. This way, you can produce 1D and 3D lookup table (LUT) files for various programs:

- **1D LUTs** assume that the primary color channels (red, green, and blue) are independent, and the output for a particular primary color (for example, red) only depends on the input value of that channel (rather than the values of all three channels). For each input value, there is one output value. 1D LUTs are represented by a curve. They are useful for quickly creating an image for viewing purposes, using less processing power, but they cannot be used to adjust saturation independently of brightness.
- In **3D LUTs**, the output values of each primary color channel are calculated based on the input values from all three channels (red, green, and blue). For each input value, there are three output values. This is represented by a 3D grid or cube. 3D LUTs can adjust saturation and brightness together, and are very useful for emulating a particular known look, such as Cineon.

See [GenerateLUT](#) and [Vectorfield](#) for more information.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output          | unnamed         | <p>Add an arrangement of Nuke nodes that do the color correction you want your 3D LUT to do. Then output the result using a GenerateLUT node.</p> <p>Alternatively, you can insert a Write node after the CMSTestPattern node, write the image out, grade it in another application, and read the result back in using a Read node. Then output the result using a GenerateLUT node.</p> |

| Control (UI)            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                     |
|-------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CMSTestPattern Tab      |                  |               |                                                                                                                                                                                                                                                                                                              |
| RGB 3D LUT<br>cube size | cube_size        | 32            | Enter the cube size to use for the test pattern. The cube size defines the size of the LUT cube on the xyz axes with higher values increasing the number of colors. In reality, you would be unlikely to use a cube size greater than 128 and the test pattern is automatically clipped above cube size 444. |

# ColorCorrect

The ColorCorrect node is used to make quick adjustments to contrast, gamma, gain, and offset. You can apply these to a clip's master (entire tonal range), shadows, midtones, or highlights.

You can control the range of the image that is considered to be in the shadows, midtones, and highlights using the lookup curves on the **Ranges** tab. However, do not adjust the midtone curve - midtones are always equal to 1 minus the other two curves.

You can also create this node by pressing **C** on the Node Graph.

See also [Grade](#) and [Multiply](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the color correction.                                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------|
| ColorCorrect Tab |                  |               |                                                                                                                         |
| channels         | channels         | rgb           | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select</p> |

| Control (UI) | Knob (Scripting)      | Default Value | Function                                                  |
|--------------|-----------------------|---------------|-----------------------------------------------------------|
|              |                       |               | individual channels.                                      |
| master       |                       |               |                                                           |
| saturation   | saturation            | 1             | Adjusts the saturation in the entire image.               |
| contrast     | contrast              | 1             | Adjusts the contrast in the entire image.                 |
| gamma        | gamma                 | 1             | Adjusts the gamma in the entire image.                    |
| gain         | gain                  | 1             | Adjusts the gain in the entire image.                     |
| offset       | offset                | 0             | Adjusts the offset in the entire image.                   |
| shadows      |                       |               |                                                           |
| saturation   | shadows.saturation    | 1             | Adjusts the saturation in the darkest parts of the image. |
| contrast     | shadows.contrast      | 1             | Adjusts the contrast in the darkest parts of the image.   |
| gamma        | shadows.gamma         | 1             | Adjusts the gamma in the darkest parts of the image.      |
| gain         | shadows.gain          | 1             | Adjusts the gain in the darkest parts of the image.       |
| offset       | shadows.offset        | 0             | Adjusts the offset in the darkest parts of the image.     |
| midtones     |                       |               |                                                           |
| saturation   | midtones.saturation   | 1             | Adjusts the saturation in the middle range of the image.  |
| contrast     | midtones.contrast     | 1             | Adjusts the contrast in the middle range of the image.    |
| gamma        | midtones.gamma        | 1             | Adjusts the gamma in the middle range of the image.       |
| gain         | midtones.gain         | 1             | Adjusts the gain in the middle range of the image.        |
| offset       | midtones.offset       | 0             | Adjusts the offset in the middle range of the image.      |
| highlights   |                       |               |                                                           |
| saturation   | highlights.saturation | 1             | Adjusts the saturation in the highlights of the image.    |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| contrast     | highlights.contrast | 1             | Adjusts the contrast in the highlights of the image.                                                                                                                                                                                                                                                                                                                                                                                                          |
| gamma        | highlights.gamma    | 1             | Adjusts the gamma in the highlights of the image.                                                                                                                                                                                                                                                                                                                                                                                                             |
| gain         | highlights.gain     | 1             | Adjusts the gain in the highlights of the image.                                                                                                                                                                                                                                                                                                                                                                                                              |
| offset       | highlights.offset   | 0             | Adjusts the offset in the highlights of the image.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Ranges Tab   |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| test         | test                | disabled      | Lets you overlay the output with black, gray, or white to show what is considered to be in the shadows, midtones, or highlights. Green and magenta indicate a mixture of ranges.                                                                                                                                                                                                                                                                              |
| curve editor | lookup              | N/A           | <p>You can use the <b>shadow</b> and <b>highlight</b> lookup curves to edit the range of the image that is considered to be in the shadows or highlights. You can also look up color information for the current pixel in the Viewer.</p> <div>  <b>Warning:</b> DO NOT adjust the <b>midtone</b> curve. Midtones are always equal to 1 minus the other two curves. </div> |
| reset        | N/A                 | N/A           | Returns the selected curve(s) to the default values.                                                                                                                                                                                                                                                                                                                                                                                                          |
| mask         | N/A                 | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                 |
|              | maskChannelInput    | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                             |
| inject       | inject              | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                  |
| invert       | invert_mask         | disabled      | Inverts the use of the mask channel so that the color                                                                                                                                                                                                                                                                                                                                                                                                         |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix luminance  | N/A              | enabled       | Enables the <b>mix luminance</b> slider. Disabling this checkbox is the same as setting <b>mix luminance</b> to 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                | mix_luminance    | 0             | Controls how much of the original luminance is preserved after the color correction. A value of 0 means the altered luminance is used in the output image. A value of 1 produces a luminance value close to that of the original input image.                                                                                                                                                                                                                                                                                                                                                 |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full color correction at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

# ColorLookup

Allows you to make contrast, gamma, gain, and offset adjustments (and, in fact, many others) using lookup tables (LUTs). LUTs refer to line graphs of a given color channel's brightness. The horizontal axis represents the channel's original, or input, values, and the vertical axis represents the channel's new, or output values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to color correct.                                                                                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                  |
|-----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| ColorLookup Tab       |                  |               |                                                                                                                                                           |
| channels              | channels         | rgba          | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>              |
| use precomputed table | use_precomputed  | enabled       | When enabled, ColorLookup uses a precomputed lookup table (LUT) between 0 and the value specified in the <b>range</b> field to increase processing speed. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| range        | range            | 1             | Sets the precomputed LUT search range between 0 and this value to increase processing speed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| curve editor | lut              | N/A           | <p>You can use the lookup curves to edit the range of the image in individual channels, or ganged using the <b>master</b> curve (which represents all channels). To edit one curve with reference to another, select multiple curves.</p> <p>You can look up color information for the current pixel in the Viewer. Drag the cursor over the pixels you want to sample for the correction. In the ColorLookup curve editor, press <b>Ctrl/Cmd+Alt</b> while clicking on the curve to set points at the places where the red, green, and blue lines intersect with the color curve. Edit the position of the points and adjust the tangent handles to adjust the curve shape for the color correction.</p> |
| reset        | N/A              | N/A           | Returns the selected curve(s) to the default values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| source       | source           | 0             | Sets a source color for adding points to the curve editor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| target       | target           | 0             | Sets a destination color for adding points to the curve editor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Set RGB      | setRGB           | N/A           | <p>Adds points on the r, g, and b curves, mapping <b>source</b> to <b>target</b>.</p> <p>You can use this control to match shadow, midtone, and highlights on two plates, for example. Set <b>source</b> to shadow rgb in one, <b>target</b> to shadow rgb in the other, then press <b>Set RGB</b>. Same for midtone and highlight areas.</p>                                                                                                                                                                                                                                                                                                                                                             |
| Set RGBA     | setRGBA          | N/A           | Adds points on the r, g, b, and alpha curves, mapping <b>source</b> to <b>target</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Set A        | setA             | N/A           | Adds points on the alpha curve, mapping <b>source</b> to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <b>target.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                          |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                      |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                           |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the color correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                        |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                           |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                               |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node. |

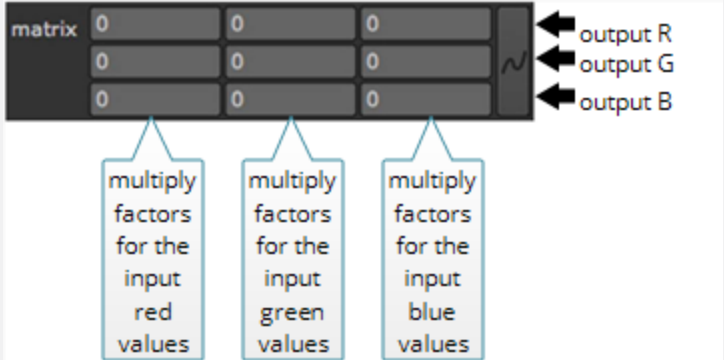
| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------|
|              |                  |               | If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                           |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full color correction at 1.             |

# ColorMatrix

ColorMatrix multiplies the rgb colors by an arbitrary 3x3 matrix. This is useful for transforming color spaces.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the color correction.                                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ColorMatrix Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| channels        | channels         | rgb           | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| matrix          | matrix           | 0             | <p>The color matrix to apply to the input image. The output values of each primary color channel are calculated based on the input values from all three channels (red, green, and blue).</p>  <p>For example, if you enter <b>0.5</b>, <b>1</b>, and <b>2</b> on the first row of the matrix, the input red value is multiplied by 0.5, the input green value by 1, and the input blue value by 2. These are then added together to produce the output red value. The output green and blue values are not affected by the first row of the matrix.</p> <p>You can get the values for the matrix from the <a href="#">Colorspace</a> node's <b>color matrix output</b> control, for example. <b>Ctrl/Cmd</b> + drag the Animation menu to copy the whole matrix at once.</p> |
| invert          | invert           | disabled      | When enabled, the inverse of the matrix is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mask            | N/A              | 0             | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | maskChannelInput | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that the color correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

# Colorspace

The Colorspace node converts images from one colorspace to another, for example from Nuke's native colorspace to other color spaces more appropriate to a given process or intended display device. This node supports RGB, HSV, YUV, CIE, and CMS formats (and various subformats). It can adjust for different primaries, white point, and different encodings.

If you wish to reverse your colorspace conversion later in the script:

1. Copy the Colorspace node and insert it at the appropriate point in your script.
2. Set the **output** controls to **sRGB**, **D55**, and **RGB**.
3. Set the **input** controls to match the values you entered in the first Colorspace node.

If you wish to write out the input clip in the new colorspace, set the **output transform** dropdown menu to **linear** in the Write node controls. This halts the automatic conversion and lets the one you created have priority.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function |
|----------------|------------------|---------------|----------|
| Colorspace Tab |                  |               |          |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels     | channels         | rgb           | <p>The colorspace correction is applied only to these channels.</p> <p>You can use the checkboxes on the right to select individual channels</p>                                                                                                                                                                                                                                        |
| input        | colorspace_in    | linear        | <p>Sets the input colorspace. This node converts the input image from this colorspace to the <b>output</b> colorspace.</p> <div>  <b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release. </div>            |
|              | illuminant_in    | D65           | <p>Sets the input illuminant to simulate colors under different lighting. For example, the default <b>D65</b> simulates illumination roughly equivalent to mid-day sun in Western or Northern Europe.</p>                                                                                                                                                                               |
|              | primary_in       | sRGB          | <p>Sets the input primaries (the exact "shade" of red, green, and blue).</p>                                                                                                                                                                                                                                                                                                            |
| output       | colorspace_out   | linear        | <p>Sets the required output colorspace. This node converts the input image from the <b>input</b> colorspace to this colorspace.</p> <div>  <b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release. </div> |
|              | illuminant_out   | D65           | <p>Sets the output illuminant to simulate colors under different lighting. For example, <b>A</b> simulates illumination from a household tungsten filament light bulb.</p>                                                                                                                                                                                                              |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | primary_out      | sRGB          | Sets the input primaries (the exact "shade" of red, green, and blue).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| swap input/output   | swap             | n/a           | Swaps the selected <b>input</b> and <b>output</b> colorspace knobs. This can be useful if you're doing certain comp tasks that work better in certain colorspace, such as grading. For example, you might go from <b>ACEScc</b> (input) to <b>scene_linear</b> (output) in a Colorspace node, perform a Grade node adjustment, copy the first Colorspace node after the Grade node, and click the <b>swap input/output</b> button to go back to <b>ACEScc</b> .                                                                                                  |
| Bradford matrix     | bradford_matrix  | disabled      | <p>If the <b>illuminant_in</b> and <b>illuminant_out</b> values are not the same, you can enable this to apply an illuminant adaptation transform. This alters colors so they <i>appear</i> the same.</p> <p>When disabled, the input and output colors have the same CIE colorspace XYZ values.</p>                                                                                                                                                                                                                                                             |
| color matrix output | colormatrix      | N/A           | <p>If a matrix is used in the color transform chosen above, the output appears here.</p> <p>Changing the matrix values has no effect, but you can copy them into a ColorMatrix node to apply them to an image. <b>Ctrl/Cmd</b> + drag the Animation menu to copy the whole matrix at once. See <a href="#">ColorMatrix</a> for more information.</p> <div>  <p><b>Note:</b> A colorspace conversion may be doing far more than just a single 3x3 matrix operation!</p> </div> |
| mask                | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# ColorTransfer

ColorTransfer lets you match the colors of one clip with those of another. It changes the colors in input **B** to match input **A**.

See also [Grade](#) and [MatchGrade](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | A               | The image sequence whose colors you want to match.  |
|                 | B               | The image sequence whose colors you want to change. |

| Control (UI)                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ColorTransfer Tab                 |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ROI x, y, r, t<br>(or x, y, w, h) | ROI              | N/A           | <p>The region of interest. This is the area in input <b>A</b> with the colors to match. By default, it is set to cover the entire input.</p> <p>You can adjust the following:</p> <ul style="list-style-type: none"> <li>• <b>x</b> - the distance (in pixels) between the left edge of image <b>A</b> and the left side of the ROI.</li> <li>• <b>y</b> - the distance (in pixels) between the bottom edge of image <b>A</b> and the bottom edge of the ROI.</li> <li>• <b>r</b> - the distance (in pixels) between the left edge of image <b>A</b> and the right side of the ROI.</li> <li>• <b>t</b> - the distance (in pixels) between the bottom edge of image <b>A</b> and the top edge of the ROI.</li> <li>• <b>w</b> - the width of the ROI. This is only available if you click the <b>wh</b> button.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>h</b> - the height of the ROI. This is only available if you click the <b>wh</b> button.</li> </ul> <p>You can also adjust the ROI in the Viewer by dragging its edges.</p> <p>When adjusting the ROI, you may want to connect the Viewer to input <b>A</b> rather than the ColorTransfer node, so you can better see the area you are selecting.</p> |

# Crosstalk

Adds or removes crosstalk, or bleeding, from one color channel to another. Each output color channel is the sum of three lookup tables, each indexed by one of the input color channels. The horizontal axis represents the channel's original, or input, values, and the vertical axis represents the channel's new, or output values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image whose color you want to adjust.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the effects are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crosstalk Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                         |
| [crossover curves] | crossover        | N/A           | <p>From the curve list on the left, select the curve you want to modify.</p> <p>For example, you'd select <b>red</b> to only modify the red values.</p> <p>You can also select <b>R-&gt;G</b>, for example, to use the red value to evaluate the curve and add the result to the green value. Adjust the curve as necessary. To insert points on the curve, <b>Ctrl/Cmd+Alt</b>+click on the curve.</p> |
| Reset              | N/A              | N/A           | Resets the selected curves to their initial positions.                                                                                                                                                                                                                                                                                                                                                  |
| mask               | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                           |
|                    | maskChannelInput | none          | The channel to use as a mask. By default, the effects are limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the effects are limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the expressions before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

# Exposure

Allows you to adjust the exposure of the input sequence using f-stops, printer lights, film densities, or Cineon values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image whose exposure you want to adjust.                                                                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the effects are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exposure Tab |                  |               |                                                                                                                                                                                                                                                                                        |
| channels     | channels         | rgb           | <p>The exposure change is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                         |
| colorspace   | colorspace       | Linear        | <p>Sets the output colorspace:</p> <ul style="list-style-type: none"> <li>• <b>Linear</b> - performs a linear multiplication to calculate the exposure.</li> <li>• <b>Cineon</b> - data is assumed to be raw data from a Cineon file requiring addition or subtraction. The</li> </ul> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>result, when passed through a Log2Lin node, approximately matches the <b>Linear</b> result.</p> <div>  <b>Note:</b> You can match <b>Linear</b> exactly if you set <b>gamma</b> to 0.6 and enable <b>ignore</b> in the Log2Lin node <b>Properties</b> panel. </div>                                                                                                                        |
| blackpoint   | blackpoint       | 0             | <p>Sets the black point (typically the darkest pixel). Any pixels of this value are set to 0. In other words, this color is turned into pure black.</p> <p>Typically, you would set this by sampling the darkest pixels in the Viewer. To find these in your image, you may want to temporarily increase the <b>gain</b> in the Viewer node controls until only the darkest pixels are visible. Adjusting the Viewer gain does not affect the colors you sample.</p>           |
| Adjust in    | mode             | Densities     | <p>Sets the range imposed on the <b>red</b>, <b>green</b>, and <b>blue</b> sliders to alter the exposure of the input image:</p> <ul style="list-style-type: none"> <li>• <b>Stops</b></li> <li>• <b>Lights</b></li> <li>• <b>Densities</b> (log10(density) of 0.6 gamma negative stock)</li> <li>• <b>Cineon</b> (offset of Cineon 10-bit log data)</li> </ul> <p>Adjusting the color sliders has the same effect in all modes, the range is a matter of user preference.</p> |
| gang         | gang             | enabled       | <p>When enabled, the color sliders are ganged together - adjustments to one affect all three equally.</p>                                                                                                                                                                                                                                                                                                                                                                      |
| red          | red              | 0             | <p>Adjusts the exposure in the red channel using the range specified by the <b>Adjust in</b> control.</p>                                                                                                                                                                                                                                                                                                                                                                      |
| green        | green            | 0             | <p>Adjusts the exposure in the green channel using the range specified by the <b>Adjust in</b> control.</p>                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| blue           | blue             | 0             | Adjusts the exposure in the blue channel using the range specified by the <b>Adjust in</b> control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the effects are limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the effects are limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the expressions before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1. |

# Expression

Allows you to apply complex mathematical formulas to a channel's values using C-like syntax expressions. If necessary, you can apply different expressions to different sets of channels.

- **x** or **y** is the pixel coordinate. If the input is a proxy image, then these are scaled and translated to the coordinate that would be in the full size image.
- **cx** and **cy** can provide a more useful coordinate system. In this system 0,0 is the center of the picture.  
-1,0 is the center of the left edge, 1,0, is the center of the right edge. 1,1 is a point 45 degrees up from the origin on the right edge (outside the top of the picture if the aspect ratio is greater than 1).
- You can refer to any input channel by name, for example **r** for the red channel.
- You can refer to any control on any node by its name. For example, **Blur1.size** returns the size of the blur. You can also evaluate animated controls, for example **Blur1.size(t)**.
- A blank expression is the same as zero.
- All math is done with 32-bit floating point numbers.

See also [MergeExpression](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply expressions.                                                                                                                                                                                                                                                                                                                    |
|                 | mask            | <p>An optional image to use as a mask. By default, the expressions are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                       |
|-----------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Expression Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                |
| [variable name field] | temp_name0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                       |
|-----------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| =                     | temp_expr1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| channels              | channel0         | red           | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select</p>                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | individual channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| =            | expr0            | N/A           | <p>The expression to apply to the above channels.</p> <p>For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type <b>(random*r)*20</b> here.</p> <p>To reference pixels in other channels, use <b>layer.channel</b> (for example, <b>matte.garbage</b>). If you don't specify the layer name, the Expression node assumes the channel is in the current layer. As a shortcut, you can use <b>r</b>, <b>g</b>, <b>b</b>, and <b>a</b> to reference the red, green, blue, and alpha channels in the <b>rgba</b> layer.</p> |
| channels     | channel1         | green         | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| =            | expr1            | N/A           | <p>The expression to apply to the above channels.</p> <p>For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type <b>(random*r)*20</b> here.</p> <p>To reference pixels in other channels, use <b>layer.channel</b> (for example, <b>matte.garbage</b>). If you don't specify the layer name, the Expression node assumes the channel is in the current layer. As a shortcut, you can use <b>r</b>, <b>g</b>, <b>b</b>, and <b>a</b> to reference the red, green, blue, and alpha channels in the <b>rgba</b> layer.</p> |
| channels     | channel2         | blue          | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| =            | expr2            | N/A           | <p>The expression to apply to the above channels.</p> <p>For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type <b>(random*r)*20</b> here.</p> <p>To reference pixels in other channels, use <b>layer.channel</b> (for example, <b>matte.garbage</b>). If you don't specify the layer name, the Expression node assumes the channel is in the current layer. As a shortcut, you can use <b>r</b>, <b>g</b>, <b>b</b>, and <b>a</b> to reference the red, green, blue, and alpha channels in the <b>rgba</b> layer.</p> |
| channels     | channel3         | alpha         | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| =            | expr3            | N/A           | <p>The expression to apply to the above channels.</p> <p>For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type <b>(random*r)*20</b> here.</p> <p>To reference pixels in other channels, use <b>layer.channel</b> (for example, <b>matte.garbage</b>). If you don't specify the layer name, the Expression node assumes the channel is in the current layer. As a shortcut, you can use <b>r</b>, <b>g</b>, <b>b</b>, and <b>a</b> to reference the red, green, blue, and alpha channels in the <b>rgba</b> layer.</p> |
| mask         | N/A              | disabled      | <p>Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|              | maskChannelInput | none          | <p>The channel to use as a mask. By default, the expressions are limited to the non-black areas of this channel.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the expressions are limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the expressions before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full expressions effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

The following functions are supported:



| Function            | Purpose                                                                                                                      | Operator Usage                                                     | Related Functions                                 |
|---------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------|
| abs (x)             | Returns the absolute value of a floating-point number x.                                                                     | x                                                                  | See also: fabs.                                   |
| acos (x)            | Calculates the arc cosine of x; that is the value whose cosine is x.                                                         | If x is less than -1 or greater 1, acos returns nan (not a number) | See also: cos, cosh, asin, atan.                  |
| asin (x)            | Calculates the arc sine of x; that is the value whose sine is x.                                                             | If x is less than -1 or greater 1, asin returns nan (not a number) | See also: sin, sinh, acos, atan.                  |
| atan (x)            | Calculates the arc tangent of x; that is the value whose tangent is x. The return value will be between -PI/2 and PI/2.      | x                                                                  | See also: tan, tanh, acos, asin, atan2.           |
| atan2 (x, y)        | Calculates the arc tangent of the two variables x and y. This function is useful to calculate the angle between two vectors. | x, y                                                               | See also: sin, cos, tan, asin, acos, atan, hypot. |
| ceil (x)            | Round x up to the nearest integer.                                                                                           | x                                                                  | See also: floor, trunc, rint.                     |
| clamp (x, min, max) | Return x clamped to the min and max values specified.                                                                        | x, min, max                                                        | See also: min, max.                               |
| clamp (x)           | Return x clamped to [0.0 ... 1.0].                                                                                           | x                                                                  | See also: min, max.                               |
| cos (x)             | Returns the cosine of x.                                                                                                     | x in radians                                                       | See also: acos, sin, tan, cosh.                   |
| cosh (x)            | Returns the hyperbolic cosine of x, which is defined mathematically as:<br>$(\exp(x) + \exp(-x)) / 2$ .                      | x                                                                  | See also: cos, acos, sinh, tanh.                  |
| degrees (x)         | Convert the angle x from radians into degrees.                                                                               | x                                                                  | See also: radians.                                |
| exp (x)             | Returns the value of e (the base of natural logarithms) raised to the power of x.                                            | x                                                                  | See also: log, log10.                             |

| Function                                 | Purpose                                                                                                                                                                                                                                                               | Operator Usage                     | Related Functions                          |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------------|
| exponent (x)                             | Exponent of x.                                                                                                                                                                                                                                                        | x                                  | See also: mantissa, ldexp.                 |
| fBm (x, y, z, octaves, lacunarity, gain) | Fractional Brownian Motion. This is the sum of octave calls to noise (). The input point for each is multiplied by pow(lacunarity,i) and the result is multiplied by pow(gain,i). For normal use, lacunarity should be greater than 1 and gain should be less than 1. | x, y, z, octaves, lacunarity, gain | See also: noise, random, turbulence.       |
| fabs (x)                                 | Returns the absolute value of the floating-point number x.                                                                                                                                                                                                            | x                                  | See also: abs.                             |
| false ()                                 | Always returns 0.                                                                                                                                                                                                                                                     | none                               | See also: true.                            |
| floor (x)                                | Round x down to the nearest integer.                                                                                                                                                                                                                                  | x                                  | See also: ceil, trunc, rint.               |
| fmod (x, y)                              | Computes the remainder of dividing x by y. The return value is $x - n y$ , where n is the quotient of $x / y$ , rounded towards zero to an integer.                                                                                                                   | x, y                               | See also: ceil, floor.                     |
| frame ()                                 | Return the current frame number.                                                                                                                                                                                                                                      | none                               | See also: x.                               |
| from_byte (color component)              | Converts an sRGB pixel value to a linear value.                                                                                                                                                                                                                       | color_component                    | See also: to_sRGB, to_rec709, from_rec709. |
| from_rec709 (color component)            | Converts a rec709 byte value to a linear brightness.                                                                                                                                                                                                                  | color_component                    | See also: from_sRGB, to_rec709.            |
| from_sRGB (color component)              | Converts an sRGB pixel value to a linear value.                                                                                                                                                                                                                       | color_component                    | See also: to_sRGB, to_rec709, from_rec709. |
| hypot (x, y)                             | Returns the $\sqrt{x^2 + y^2}$ . This is the length of the hypotenuse of a right-angle triangle with sides of                                                                                                                                                         | x, y                               | See also: atan2.                           |

| Function         | Purpose                                                                                                                                                                                                                                                         | Operator Usage            | Related Functions                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|
|                  | length x and y.                                                                                                                                                                                                                                                 |                           |                                     |
| int (x)          | Round x to the nearest integer not larger in absolute value.                                                                                                                                                                                                    | x                         | See also: ceil, floor, trunc, rint. |
| ldexp (x, exp)   | Returns the result of multiplying the floating-point number x by 2 raised to the power exp.                                                                                                                                                                     | x, exp                    | See also: exponent.                 |
| lerp (a, b, x)   | Returns a point on the line f(x) where f(0)=a and f(1)=b.<br><br>Matches the lerp function in other shading languages.                                                                                                                                          | a, b, x                   | See also: step, smoothstep.         |
| log (x)          | Returns the natural logarithm of x.                                                                                                                                                                                                                             | x                         | See also: log10, exp.               |
| log10 (x)        | Returns the base-10 logarithm of x.                                                                                                                                                                                                                             | x                         | See also: log, exp.                 |
| logb (x)         | Same as exponent().                                                                                                                                                                                                                                             | x                         | See also: mantissa, exponent.       |
| mantissa (x)     | Returns the normalized fraction. If the argument x is not zero, the normalized fraction is x times a power of two, and is always in the range 1/2 (inclusive) to 1 (exclusive). If x is zero, then the normalized fraction is zero and exponent() returns zero. | x                         | See also: exponent                  |
| max (x, y, ... ) | Return the greatest of all values.                                                                                                                                                                                                                              | x, y, (...)               | See also: min, clamp.               |
| min (x, y, ... ) | Return the smallest of all values.                                                                                                                                                                                                                              | x, y, (...)               | See also: max, clamp                |
| mix (a, b, x)    | Same as lerp().                                                                                                                                                                                                                                                 | a, b, x                   | See also: step, smoothstep, lerp    |
| noise (x, y, z)  | Creates a 3D Perlin noise value - a signed range centered on zero. The absolute maximum range is from -1.0 to 1.0.                                                                                                                                              | x, optional y, optional z | See also: random, fBm, turbulence   |

| Function             | Purpose                                                                                                                                                                                            | Operator Usage                     | Related Functions                 |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------|
|                      | This produces zero at all integers, so you should rotate the coordinates somewhat (add a fraction of y and z to x, etc.) if you want to use this for random number generation.                     |                                    |                                   |
| pi ()                | Returns the value for pi (3.141592654...).                                                                                                                                                         | none                               | none                              |
| pow (x, y)           | Returns the value of x raised to the power of y.                                                                                                                                                   | x, y                               | See also: log, exp, pow           |
| pow2 (x)             | Returns the value of x raised to the power of 2.                                                                                                                                                   | x, y                               | See also: pow                     |
| radians (x)          | Convert the angle x from degrees into radians.                                                                                                                                                     | x                                  | See also: degrees                 |
| random (x, y, z)     | Creates a pseudo random value between 0 and 1 - it always generates the same value for the same x, y and z.<br><br>Calling random with no arguments creates a different value on every invocation. | optional x, optional y, optional z | See also: noise, fBm, turbulence  |
| rint (x)             | Round x to the nearest integer.                                                                                                                                                                    | x                                  | See also: ceil, floor, int, trunc |
| sin (x)              | Returns the sine of x.                                                                                                                                                                             | x in radians                       | See also: asin, cos, tan, sinh    |
| sinh (x)             | Returns the hyperbolic sine of x, which is defined mathematically as:<br>$(\exp(x) - \exp(-x)) / 2$ .                                                                                              | x                                  | See also: sin, asin, cosh, tanh   |
| smoothstep (a, b, x) | Returns 0 if x is less than a, returns 1 if x is greater or equal to b, returns a smooth cubic interpolation otherwise.                                                                            | a, b, x                            | See also: step, lerp              |

| Function                    | Purpose                                                                                                                                                         | Operator Usage  | Related Functions                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------|
|                             | Matches the smoothstep function in other shading languages.                                                                                                     |                 |                                             |
| sqrt (x)                    | Returns the non-negative square root of x.                                                                                                                      | x               | See also: pow, pow2                         |
| step (a, x)                 | Returns 0 if x is less than a, returns 1 otherwise.<br><br>Matches the step function other shading languages.                                                   | a, x            | See also: smoothstep, lerp                  |
| tan (x)                     | Returns the tangent of x.                                                                                                                                       | x in radians    | See also: atan, cos, sin, tanh, atan2       |
| tanh (x)                    | Returns the hyperbolic tangent of x, which is defined mathematically as:<br>$\sinh(x) / \cosh(x)$ .                                                             | x               | See also: tan, atan, sinh, cosh             |
| to_byte (color component)   | Converts a floating point pixel value to an 8-bit value that represents that number in sRGB space.                                                              | color_component | See also: from_sRGB, to_rec709, from_rec709 |
| to_rec709 (color component) | Converts a floating point pixel value to an 8-bit value that represents that brightness in the rec709 standard when that standard is mapped to the 0-255 range. | color_component | See also: from_sRGB, from_rec709            |
| to_sRGB (color component)   | Converts a floating point pixel value to an 8-bit value that represents that number in sRGB space.                                                              | color_component | See also: from_sRGB, to_rec709, from_rec709 |
| true ()                     | Always Returns 1.                                                                                                                                               | none            | See also: false                             |
| trunc (x)                   | Round x to the nearest integer                                                                                                                                  | x               | See also: ceil, floor, int, rint            |

| Function                                        | Purpose                                                                              | Operator Usage                             | Related Functions            |
|-------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------|------------------------------|
|                                                 | not larger in absolute value.                                                        |                                            |                              |
| turbulence (x, y, z, octaves, lacunarity, gain) | This is the same as fBm() except the absolute value of the noise() function is used. | x, y, z, octaves, lacunarity, gain         | See also: fBm, noise, random |
| x ()                                            | Return the current frame number.                                                     | none                                       | See also: frame              |
| y (frame)                                       | Evaluates the y value for an animation at the given frame.                           | optional: frame, defaults to current frame | none                         |

# Gamma

Applies a constant gamma value to a set of channels. This lightens or darkens the midtones.

The actual function is **1/pow(value)**.



**Note:** Increasing the gamma to lighten the midtones darkens any values above 1. Similarly, decreasing the gamma to darken the midtones lightens any values below 0. If you don't want this to happen, you can instead use a [Colorspace](#) node, which allows you to adjust the gamma using a color curve rather than a slider. Simply add points on the curve just below 0 and above 1 to preserve the super blacks and whites.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply a gamma value.                                                                                                                                                                                                                                                                                                                      |
|                 | mask            | <p>An optional image to use as a mask. By default, the gamma adjustment is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gamma Tab    |                  |               |                                                                                                                                                                                                                                                             |
| channels     | channels         | all           | <p>The gamma adjustment is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                             |
| value        | value            | 1             | <p>The gamma value. The default value of 1 equals no change.</p> <p>Note that you can enter formulae into this field, making it easy to do quick calculations. For example, you could type <b>1/2.2</b> here and press <b>Return</b> to get 0.45454545.</p> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                               |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the gamma adjustment is limited to the non-black areas of this                                                                                                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the gamma adjustment is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the gamma adjustment before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full gamma adjustment at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



# GenerateLUT

Generates lookup tables, or LUTs, from color management nodes downstream of a CMSTestPattern node. LUTs are generated according to the size of CMSTestPattern cube size.

You can use the GenerateLUT node to create both 1D and 3D LUTs:

- **1D LUTs** assume that the primary color channels (red, green, and blue) are independent, and the output for a particular primary color (for example, red) only depends on the input value of that channel (rather than the values of all three channels). For each input value, there is one output value. 1D LUTs are represented by a curve. They are useful for quickly creating an image for viewing purposes, using less processing power, but they cannot be used to adjust saturation independently of brightness.
- In **3D LUTs**, the output values of each primary color channel are calculated based on the input values from all three channels (red, green, and blue). For each input value, there are three output values. This is represented by a 3D grid or cube. 3D LUTs can adjust saturation and brightness together, and are very useful for emulating a particular known look, such as Cineon.



**Tip:** For good visual fidelity when using 3D LUTs, it is recommended that a log colorspace is used for 3D LUT generation. For more information on how to generate a LUT in log colorspace, please refer to Nuke's [online help](#).

For more information, see [CMSTestPattern](#) and [Vectorfield](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                            |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | An arrangement of nodes that do the color correction you want your 3D LUT to do, preceded by a CMSTestPattern node. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                           |
|-----------------|------------------|---------------|----------------------------------------------------|
| GenerateLUT Tab |                  |               |                                                    |
| output file     | file             | none          | The path and file name of the LUT file you want to |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | generate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| file type    | file_type        | none          | <p>The file format of the LUT file you want to generate. If this is set to <b>auto</b> (the default), Nuke guesses the format from the file name extension.</p> <p>The following file extensions are recognized:</p> <ul style="list-style-type: none"> <li>• <b>.3dl</b> - Autodesk and ASSIMILATE Scratch LUT format (3D).</li> <li>• <b>.blut</b> - Side Effects Houdini binary LUT format (3D).</li> <li>• <b>.cms</b> - Light Illusion LightSpace CMS LUT format (1D and 3D).</li> <li>• <b>.csp</b> - Rising Sun Research CineSpace LUT format (3D).</li> <li>• <b>.cub</b> - FilmLight Truelight LUT format (1D and 3D).</li> <li>• <b>.cube</b> - IRIDAS LUT format (1D and 3D).</li> <li>• <b>.vf</b> - Nuke's native LUT format used by the Vectorfield node (3D).</li> </ul> |



**Note:** FilmLight and Foundry have elected to no longer bundle Truelight as of Nuke 11. The Truelight node has been superseded by the free version of Baselight for Nuke which itself can import a BLG (Basilight Linked Grade) that can contain a Truelight strip, plus optionally a lot more in terms of creative grading intent. Together with OpenColorIO and the native Nuke Vectorfield node we feel all the Nuke color management issues for which the Truelight node was originally intended are now addressed.

For further information on Baselight for Nuke, please contact [plugin-support@filmlight.ltd.uk](mailto:plugin-support@filmlight.ltd.uk)

1D preLUT

| Control (UI)                                                                                      | Knob (Scripting)   | Default Value        | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------|--------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1D preLUT size                                                                                    | lut1d              | 1024                 | The size of the 1D LUT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                   | style1d            | logarithmic          | Some systems assume the LUT is designed to apply to <b>logarithmic</b> images, others <b>linear</b> . Some LUT formats are assumed to encode values as either logarithmic or linear. Use this setting to get your output LUT values encoded the way your use of the LUT requires.                                                                                                                                                                                                                                                                                                      |
| 3D LUT (These controls are only visible when you've selected 3dl in the file type dropdown menu.) |                    |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| input bit depth (.3dl)                                                                            | bitdepth_id        | 10 bit               | The bit depth to scale input values to for .3dl files. For example, a 10-bit file has values between 0 and 1023.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| output bit depth (.3dl)                                                                           | output_bitdepth_id | input bit depth      | The bit depth to scale output values to for .3dl files. For instance a 10-bit file has values between 0 and 1023. In general this should match the input bit depth.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| clamp output                                                                                      | clamp_output       | enabled              | Clamp 3D LUT output values to the range of 0-1. Turning this off allows superwhite values to be represented which are allowed in some packages, such as Nuke. This may cause the result to be unreadable in other packages.                                                                                                                                                                                                                                                                                                                                                            |
| 3dl file format                                                                                   | format_3dl_id      | autodesk flame/smoke | <p>Select the format you want to use for your .3dl file. The final cube size is determined by the CMSTestPattern which generates the input.</p> <ul style="list-style-type: none"> <li>• <b>autodesk flame/smoke</b> - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65.</li> <li>• <b>autodesk lustre</b> - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65, and output a 3DMESH/Mesh header.</li> <li>• <b>assimilate scratch</b> - scale and offset the 3D LUT. This should be used only for legacy scratch files prior to Flame compatibility.</li> </ul> |
| Generate and Write LUT                                                                            | generate           | N/A                  | Generate the LUT file and save it to the <b>output file</b> location.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| File                                                                                                                                                   |                   |               |                                                                                                                                                      |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                      |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                         |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# Grade

Lets you define white and black points by sampling pixels from the Viewer. Setting the brightest parts of the image to pure white and the darkest to pure black in this manner can help you add punch to overexposed images, for example. You can also use this node for matching foreground plates to background plates.

To sample pixels from the Viewer, click on a color swatch to the right of the control you want to set. The eye dropper icon appears. In the Viewer:

- **Ctrl/Cmd**+click to sample a single pixel from the node's output.
- **Ctrl/Cmd**+**Shift**+drag to sample a region of pixels from the node's output.
- **Ctrl/Cmd**+**Alt**+click to sample a single pixel from the node's input while viewing its output.
- **Ctrl/Cmd**+**Alt**+**Shift**+drag to sample a region of pixels from the node's input while viewing its output.
- **Ctrl/Cmd**+ right-click cancels pixel selections.

You can also create this node by pressing **G** on the Node Graph.

See also [ColorCorrect](#) and [Multiply](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose tonal range you want to define.                                                                                                                                                                                                                                                                                                                          |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grade Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| channels     | channels         | rgb           | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                             |
| blackpoint   | blackpoint       | 0             | <p>Sets the black point (typically the darkest pixel). Any pixels of this value are set to 0. In other words, this color is turned into pure black.</p> <p>Typically, you would set this by sampling the darkest pixels in the Viewer. To find these in your image, you may want to temporarily increase the gain in the Viewer controls until only the darkest pixels are visible. Adjusting the Viewer gain does not affect the colors you sample.</p> |
| whitepoint   | whitepoint       | 1             | <p>Sets the white point (typically the lightest pixel). Any pixels of this value are set to 1. In other words, this color is turned into pure white.</p>                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | Typically, you would set this by sampling the brightest pixels in the Viewer. To find these in your image, you may want to temporarily lower the gamma in the Viewer controls until only the brightest pixels are visible. Adjusting the Viewer gamma does not affect the colors you sample.                                                                                                                                                                                           |
| lift         | black            | 0             | <p>Any pixels that are black are set to this color.</p> <p>This allows you to, for example, match the tonal range of one clip with that of another. First, set <b>blackpoint</b> to the darkest pixel in the image whose colors you want to change (pressing <b>Alt</b> to make sure you sample from the input). Then, set this control to the darkest pixel in the image whose tonal range you want to match (not pressing <b>Alt</b> to make sure you sample from the output).</p>   |
| gain         | white            | 1             | <p>Any pixels that are white are set to this color.</p> <p>This allows you to, for example, match the tonal range of one clip with that of another. First, set <b>whitepoint</b> to the lightest pixel in the image whose colors you want to change (pressing <b>Alt</b> to make sure you sample from the input). Then, set this control to the lightest pixel in the image whose tonal range you want to match (not pressing <b>Alt</b> to make sure you sample from the output).</p> |
| multiply     | multiply         | 1             | Multiplies the result of the Grade node by this factor. This has the effect of lightening the result while preserving the black point.                                                                                                                                                                                                                                                                                                                                                 |
| offset       | add              | 0             | Offsets the result of the Grade node. Offsetting is to add a fixed value to the result, which, in effect lightens the whole image. You can also add a negative value to the result, in which case the whole image gets darker.                                                                                                                                                                                                                                                         |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                            |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| gamma          | gamma            | 1             | Applies a constant gamma value to the result of the Grade node. This lightens or darkens the midtones.                                                              |
| reverse        | reverse          | disabled      | Allows you to copy and paste this node and invert its effect further downstream. This performs the opposite gamma correction, followed by the opposite linear ramp. |
| black clamp    | black_clamp      | enabled       | When enabled, any output values that are lower than 0 are set to 0.                                                                                                 |
| white clamp    | white_clamp      | disabled      | When enabled, any output values that are higher than 1 are set to 1.                                                                                                |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                       |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.                                                   |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                        |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the color correction is limited to the non-white areas of the mask.                                                     |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                        |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                            |
|                | unpremult        | none          | The image is divided by this channel before being                                                                                                                   |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full color correction at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

# HistEQ

Alters the histogram of the input image to be flat. This process is called histogram equalization. It can be useful for increasing the contrast in an image, for example, if the background and foreground in the image are both bright or both dark.

## Inputs and Controls

| Connection Type | Connection Name | Function                        |
|-----------------|-----------------|---------------------------------|
| Input           | unnamed         | The image sequence to equalize. |



| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                      |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| HistEQ Tab        |                  |               |                                                                                                                               |
| Histogram Entries | histeqbins       | 4096          | Adjust the number of entries in the histogram.                                                                                |
| mask              | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|                   | maskChannelInput | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.             |
| invert mask       | invert_mask      | disabled      | Inverts the use of the mask channel so that the color correction is limited to the non-white areas of the mask.               |

# Histogram

Histogram graphs the number of pixels at each brightness level. This is a useful gauge to see whether the input image has a good distribution of shadows, midtones, and highlights.

You can also use this node to adjust the tonal range of the input image. Note, however, that Histogram clamps superblacks and superwhites. If you don't want this to happen, use the [Grade](#) node instead.



**Tip:** You can also use the histogram panel available in the content menu  under **Windows > Histogram**.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose tonal range you want to examine or adjust.                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Histogram Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Histogram     | hist             | N/A           | The horizontal axis represents brightness (the numerical value of a pixel), with the shadows on the left, midtones in the middle, and highlights on the right. The vertical axis represents pixel count (the percentage of pixels with that value).                                                                                                                                                                                                                                                                                                      |
| input range   | in               | 0, 1, 1       | <p>Allows you to extend the image's tonal range, which has the effect of increasing contrast.</p> <p>To set the black point, drag the leftmost input range slider till it roughly lines up with the initial boundary of the histogram. This makes shadows darker.</p> <p>To set the white point, drag the rightmost input range slider till it roughly lines up with the final boundary of the histogram. This makes highlights lighter.</p> <p>To set the midtone, or neutral, value, drag the middle input slider. This applies a gamma correction</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>(lightens or darkens the midtones).</p> <p>The histogram updates as you adjust these controls.</p>                                                                                                                                                                                                                                                                                                                                                            |
| output range | out              | 0, 1          | <p>Sets the range to which the <b>input range</b> is mapped. This can be used to shorten the image's tonal range, which has the effect of removing pure black and white and decreasing contrast.</p> <p>Any pixels that are black are set to the value on the left. This makes shadows lighter.</p> <p>Any pixels that are white are set to the value on the right. This makes highlights darker.</p> <p>The histogram updates as you adjust these controls.</p> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                    |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the color correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                     |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the color correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                  |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full color correction at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

# HSVTool

HSVTool lets you simultaneously adjust hue, saturation, and value components from a single control panel. It also features a color replacement tool and makes an excellent keyer.

The main strength of this node is the precision it offers in limiting corrections to a narrow sample of colors. You can limit the correction to certain hues by sampling a few pixels and then shifting their values. Because you limit the color range, the surrounding image is generally unaffected by the shift.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                   |
|-----------------|-----------------|------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose HSV components you are adjusting. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                      |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| HSVTool Tab       |                  |               |                                                                                                                               |
| Color Replacement |                  |               |                                                                                                                               |
| srccolor          | srccolor         | 0             | Sets the source color you intend to adjust from.                                                                              |
| dstcolor          | dstcolor         | 0             | Sets the destination color you intend to adjust to.                                                                           |
| Hue               |                  |               |                                                                                                                               |
| Range             | huesrcs          | 0, 360        |                                                                                                                               |
| Rotation          | huerotation      | 0             |                                                                                                                               |
| Reset             | huereset         | N/A           | Click to reset all Hue controls to the default setting.                                                                       |
| Range Rolloff     | huerolloffrange  | 0             |                                                                                                                               |
| HMask             | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|                   | HMask            | none          | The channel to use as a hue mask.                                                                                             |
| invert mask       | invert_hue_mask  | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                     |
| Saturation        |                  |               |                                                                                                                               |
| Range             | satsrcs          | 0, 1          |                                                                                                                               |
| Adjustment        | saturation       | 0             |                                                                                                                               |
| Reset             | satreset         | N/A           | Click to reset all Saturation controls to the default setting.                                                                |

| Control (UI)  | Knob (Scripting)   | Default Value | Function                                                                                                                      |
|---------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| Range Rolloff | satrolloffrange    | 0             |                                                                                                                               |
| Force Value   | setsaturation      | disabled      |                                                                                                                               |
| SMask         | N/A                | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|               | SMask              | none          | The channel to use as a saturation mask.                                                                                      |
| invert mask   | invert_sat_mask    | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                     |
| Brightness    |                    |               |                                                                                                                               |
| Range         | brtsrscs           | 0, 1          |                                                                                                                               |
| Adjustment    | brightness         | 0             |                                                                                                                               |
| Reset         | brtreset           | N/A           | Click to reset all Brightness controls to the default setting.                                                                |
| Range Rolloff | brtrolloffrange    | 0             |                                                                                                                               |
| Force Value   | setbrightness      | disabled      |                                                                                                                               |
| BMask         | N/A                | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|               | BMask              | none          | The channel to use as a brightness mask.                                                                                      |
| invert mask   | invert_bright_mask | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                     |
| output        | N/A                | enabled       | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|               | output             | rgba.alpha    | The channel to use for the output mask.                                                                                       |
| is            | Conversion         | hue           |                                                                                                                               |
| invert mask   | invert_alpha_mask  | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                     |

# HueCorrect

Lets you make precision adjustments to the levels of saturation in a range of hues. You do so via edits to a series of suppression curves. The horizontal axis represents the original, or input, saturation, and the vertical axis represents the new, or output, saturation.

By choosing which curve you edit and how much of that curve you alter, you can precisely limit the influence of the effect.

For the compositor, HueCorrect is obviously of greatest use in diminishing green, blue, or redscreen spill.

For the times when you just want to correct the saturation component and don't require limiting the correction to any particular range of hues, you can also use the [Saturation](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to correct.                                                                                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                           |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------|
| HueCorrect Tab |                  |               |                                                                                                                                    |
| channels       | channels         | rgb           | <p>The correction is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>,</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                           |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                             |
| curve editor   | hue              | N/A           | Use the curves to adjust the hue of the input image. You can also look up color information for the current pixel in the Viewer.                                                                                                                                                   |
| reset          | N/A              | N/A           | Click to reset the curves to the default values.                                                                                                                                                                                                                                   |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                      |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the correction is limited to the non-black areas of this channel.                                                                                                                                                                        |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                       |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                                                                                                                                                                          |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                       |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                           |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the correction before |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                           |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one HueShift node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert        | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                    |
| mix luminance | N/A              | enabled       | Enables the <b>mix luminance</b> slider. Disabling this checkbox is the same as setting <b>mix luminance</b> to 0.                                                                                                                                                                                 |
|               | mix_luminance    | 0             | Controls how much of the original luminance is preserved after the color correction. A value of 0 means the altered luminance is used in the output image. A value of 1 produces a luminance value close to that of the original input image.                                                      |
| mix           | mix              | 1             | Dissolves between the original image at 0 and the full correction at 1.                                                                                                                                                                                                                            |

# HueShift

HueShift transforms the input image's colorspace. It works by transforming the colors to CIE XYZ space and then doing simple scales and rotates on the space. In XYZ space, X and Z control the color and Y is the brightness.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to hue shift.                                                                                                                                                                                                                                                                                                                                       |
|                 | mask            | <p>An optional image to use as a mask. By default, the shift is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                             |
|-----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HueCorrect Tab        |                  |               |                                                                                                                                                                                                      |
| channels              | channels         | rgb           | <p>The shift is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| input graypoint       | ingray           | 0.25          | After converting to CIE XYZ space, the colors are skewed so that this gray color is $X = Z = 0$ .                                                                                                    |
| output graypoint      | outgray          | 0.25          | After all other operations are completed, the CIE XYZ space is skewed to the output gray point so a fully desaturated images is tinted the specified color.                                          |
| overall saturation    | saturation       | 1             | Multiplies X and Z by the specified overall saturation value.                                                                                                                                        |
| color axis rgb        | color            | 1, 0, 0       | Adjusts the saturation in one direction in the XZ plane by setting this color axis. Adjust the <b>saturation along axis</b> control to affect the saturation.                                        |
| saturation along axis | color_saturation | 1             | Adjusts the color saturation in the direction specified by the <b>color axis</b> control.                                                                                                            |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| hue rotation   | hue_rotation     | 0             | Adjusts the rotation around the Y axis, which is mostly useful for making psychedelic effects.                                                                                                                                                                                                                                                                                                                                                                                 |
| brightness     | brightness       | 1             | Multiplies the image by the specified value.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                  |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                    |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                   |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                      |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                   |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                       |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one HueShift node. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------|
|              |                  |               | If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                           |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full shift at 1.                        |

# Invert

Inverts a channel's values. To invert a channel is to subtract its values from one, which causes its blacks to become white and its whites to become black. In the course of building a script, you'll have frequent need to invert mattes in particular.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to invert.                                                                                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the inversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                 |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Invert Tab     |                  |               |                                                                                                                                                                                                          |
| channels       | channels         | all           | <p>The inversion is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| clamp          | clamp            | disabled      | Restricts the results of the inversion to values between 0 and 1, clamping superblacks and superwhites.                                                                                                  |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                            |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the inversion is limited to the non-black areas of this channel.                                                                                               |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                             |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the inversion is limited to the non-white areas of the mask.                                                                                                 |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                      |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                 |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the inversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full inversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                            |

## Log2Lin

Whenever you read a clip into a script, it is automatically converted to Nuke's native color space, which is 32-bit per channel RGB, a linear format. This conversion takes place even if the clip you read in is in the Kodak Cineon format, which is a logarithmic format. The reverse of this conversion, called a lin-to-log conversion, also automatically takes place when you write the processed element back out of the script - that is, Nuke automatically converts it back into a Cineon element.

Nuke uses the Kodak-recommended settings when making Cineon conversions in either direction. It's rare that you would want to override these settings, but if it becomes necessary you can use the Log2Lin node. If you do, you should also check **raw data** (or set **colorspace** to **linear**) in the Read and Write node controls to skip the automatic conversion.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to convert.                                                                                                                                                                                                                                                                                                                                            |
|                 | mask            | <p>An optional image to use as a mask. By default, the shift is conversion to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Log2Lin Tab  |                  |               |                                                                                                                                                                                                                        |
| channels     | channels         | rgb           | <p>The conversion is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>              |
| operation    | operation        | log2lin       | <p>Sets whether the conversion is from or to Cineon log colorspace:</p> <ul style="list-style-type: none"> <li>• <b>log2lin</b> - from Cineon colorspace.</li> <li>• <b>lin2log</b> - to Cineon colorspace.</li> </ul> |
| black        | black            | 95            | Sets the value in the Cineon file that is converted into 0.                                                                                                                                                            |
| reset        | N/A              | N/A           | Click to reset the <b>black</b> value to the default setting.                                                                                                                                                          |
| ignore       | ignore_black     | disabled      | When enabled, the black offset is not subtracted so that the conversion is a pure log function.                                                                                                                        |
| white        | white            | 685           | Sets the value in the Cineon file that is converted into 1.                                                                                                                                                            |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| reset          | N/A              | N/A           | Click to reset the <b>white</b> value to the default setting.                                                                                                                                                                                                                                                                                                                               |
| gamma          | gamma            | 0.6           | Sets the exposed light level multiplier to calculate the film density.                                                                                                                                                                                                                                                                                                                      |
| reset          | N/A              | N/A           | Click to reset the <b>gamma</b> value to the default setting.                                                                                                                                                                                                                                                                                                                               |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                               |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the conversion is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                 |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                   |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                                                                                |
|                |                  |               | When disabled, the effect is applied to the entire mask..                                                                                                                                                                                                                                                                                                                                   |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                    |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a</p> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>Premult node after, but allows you to work faster if you're only using one node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                         |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full conversion at 1.                                                                                                                 |

# MatchGrade

MatchGrade (NukeX and Nuke Studio only) allows you to automatically calculate a grade to match the colors in the **Source** input to the colors in the **Target** input. You can use MatchGrade to:

- extract a baked-in grade if the **Target** clip that you want to match to contains the same frames as the **Source** clip,
- match the grade between two different clips to create the same look,
- mask the grade to only match certain elements between the **Source** and **Target** clips, and
- export LUT or CDL files to re-use the calculated grade elsewhere.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                        |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Target          | <p>The image sequence you want the <b>Source</b> clip to match.</p> <p>When <b>Task</b> is set to <b>Match Graded Source</b>, this should be a graded version of the <b>Source</b> footage.</p> |

| Connection Type | Connection Name | Function                                                                                                                                     |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | When <b>Task</b> is set to <b>Match Different Clip</b> , this should be a different clip rather than a version of the <b>Source</b> footage. |
|                 | Source          | The image sequence to which the color transform is applied.                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MatchGrade Tab |                  |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Task           | matchGradeTask   | Match Graded Source      | <p>Choose whether you want to match the <b>Source</b> input with a graded version of the same clip or a different clip:</p> <ul style="list-style-type: none"> <li>• <b>Match Graded Source</b> - Match the <b>Source</b> clip with a graded version of the same clip (connected to the <b>Target</b> input). This allows you to extract and export a baked-in grade applied to the original clip.</li> </ul> <p>In this mode, MatchGrade expects the same frames in both its inputs.</p> <ul style="list-style-type: none"> <li>• <b>Match Different Clip</b> - Match the colors of one clip (<b>Source</b>) with those of another (<b>Target</b>). This allows you to create a grade to reproduce the look of the <b>Target</b> clip in the <b>Source</b> clip.</li> </ul> <p>In this mode, MatchGrade expects different frames in the <b>Source</b> and <b>Target</b> inputs.</p> |
| Analysis       | analysisType     | Analyze Reference Frames | <p>Set the type of analysis to perform:</p> <ul style="list-style-type: none"> <li>• <b>Analyze Reference Frames</b> - Calculate a single, global grade from selected reference frames that cover the characteristic colors in the sequence and apply that grade to every frame of the <b>Source</b> sequence. You can use the controls under <b>Ref Frames</b> to choose the reference frames.</li> <li>• <b>Auto-analyze Per Frame</b> - Calculate a local</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | <p>grade frame-by-frame, so that the color transform updates according to the current frame.</p> <div>  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Graded Source</b>.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Mask                         | mask             | None          | <p>Set whether to use a mask channel to limit the grade to certain areas of the image:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - Do not use a mask. The grade is applied to the entire image.</li> <li>• <b>Alpha</b> - Use the alpha channel as a mask. The grade is limited to the non-black areas of the alpha channel.</li> <li>• <b>Inverted Alpha</b> - Invert the alpha channel and use that as a mask. The grade is limited to the non-white areas of the alpha channel.</li> </ul> <p>Using a mask can be useful if you only want to match certain elements between shots or balance the color content when <b>Task</b> is set to <b>Match Different Clip</b>.</p> <div>  <b>Note:</b> When <b>Task</b> is set to <b>Match Graded Source</b>, only the alpha from the <b>Source</b> input is used. When <b>Task</b> is set to <b>Match Different Clip</b>, the alpha from both inputs is used.         </div> |
| Apply Grade to Masked Region | applyToMask      | enabled       | <p>When enabled, the computed grade is only applied to the areas of the source controlled by the <b>Mask</b>.</p> <p>When disabled, the grade is applied to the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)           | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                     |               | <p>whole image instead, allowing you to compute the grade from a selected region and apply it to the whole image without having to export the LUT.</p> <div>  <b>Note:</b> This control is only displayed when the <b>Mask</b> control is set to anything other than <b>None</b>.         </div>                                                                                                                                     |
| Output                 | output              | Matched       | <p>Select what to display in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Matched</b> - View the color matched result.</li> <li>• <b>Source</b> - View the <b>Source</b> input. This can be useful when setting reference frames for the <b>Source</b> input.</li> <li>• <b>Target</b> - View the <b>Target</b> input. This can be useful when setting reference frames for the <b>Target</b> input.</li> </ul>                                                                                        |
| Align Target to Source | alignTargetToSource | N/A           | <p>Click this to add a Transform node and a Reformat node upstream of the MatchGrade node to automatically align the target with the source clip.</p> <p>You can use <b>Align Target to Source</b> if the clips are not aligned in time and space, such as when the target clip has been reformatted.</p> <div>  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Graded Source</b>.         </div> |
| Crop Target            | autoCrop            | disabled      | <p>When enabled, clicking <b>Align Target to Source</b> generates a rectangular crop for the target input.</p> <p>You can use <b>Crop Target</b> if the target contains</p>                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)                                                                                                    | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                 |                       |               | <p>a region that isn't present in the source, for example a black border.</p> <div>  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Graded Source</b>. </div>                                                                                                                                                                                                                       |
| Ref Frames - These controls are only available when <b>Analysis</b> is set to <b>Analyze Reference Frames</b> . |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Source                                                                                                          | sourceRefFrames       | 0             | <p>Displays the <b>Source</b> input frames that you have set as reference frames. These should be frames that cover the characteristic colors in the <b>Source</b> sequence.</p> <p>When <b>Task</b> is set to <b>Match Graded Source</b>, the same frames are also used as reference frames from the <b>Target</b> input.</p>                                                                                                                                                                        |
|                               | addSourceRef-Frame    | N/A           | Set the current <b>Source</b> input frame as a reference frame.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                              | deleteSourceRef-Frame | N/A           | Remove the current <b>Source</b> input frame from the reference frames.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Target                                                                                                          | targetRefFrames       | 0             | <p>Displays the <b>Target</b> input frames that you have set as reference frames. These should be frames that cover similar content as the <b>Source</b> reference frames (for example, the same amount of grass, skin, and so on).</p> <div>  <b>Note:</b> You do not need to use the same number of <b>Source</b> and <b>Target</b> reference frames or set the same frames as reference frames for both. </div> |

| Control (UI)                                                                      | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                       |               |  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Different Clip</b> .                                                                                                                                                                                                                                                                                                                                                                                                     |
|  | addTargetRefFrame     | N/A           | Set the current <b>Target</b> input frame as a reference frame.<br><br> <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Different Clip</b> .                                                                                                                                                                                                                                                                                                                              |
|  | deleteTargetRef-Frame | N/A           | Remove the current <b>Target</b> input frame from the reference frames.<br><br> <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Different Clip</b> .                                                                                                                                                                                                                                                                                                                      |
| Analysis                                                                          |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Transform                                                                         | transform             | 3D LUT        | Set the transformation used to grade the <b>Source</b> input: <ul style="list-style-type: none"> <li>• <b>3D LUT</b> - Calculate the grade as a 3D look-up table (LUT). If necessary, you can use the <b>Export</b> controls to write this to a <b>.csp</b> format and then click <b>Create OCIOFileTransform</b> to create an OCIOFileTransform node that applies the grade.</li> <li>• <b>CDL</b> - Calculate the grade as a color decision list (CDL). If necessary, you can click <b>Create OCIOCDLTransform</b> to create an OCIOCDLTransform node that applies the grade.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <div>  <b>Note:</b> The CDL transform is limited and cannot model all types of color transformation. In most cases, selecting <b>3D LUT</b> gives the best results. </div> <div>  <b>Note:</b> This control is only available when you have set at least one reference frame. </div> |
| Pre LUT        | prelut           | Auto Detect   | <p>Specify a 1D shaper LUT to use for the analysis:</p> <ul style="list-style-type: none"> <li>• <b>Auto Detect</b> - Automatically detect the best pre-LUT to use.</li> <li>• <b>Linear</b> - Use a linear pre-LUT.</li> <li>• <b>Logarithmic</b> - Use a logarithmic pre-LUT.</li> </ul>                                                                                                                                                             |
| LUT Resolution | lutres           | 32            | <p>Set the resolution of the LUT in which MatchGrade stores the color transformation.</p> <p>A value of 16 speeds up processing. A value of 64 can improve the results, but also increases processing time.</p> <p>If two very similar colors in the <b>Source</b> image are very different in the <b>Target</b>, try setting this to 64, which is the maximum value.</p>                                                                              |
| Colorspace     | colorspace       | RGB           | <p>Set the colorspace to use:</p> <ul style="list-style-type: none"> <li>• <b>RGB</b></li> <li>• <b>YUV</b></li> <li>• <b>LAB</b></li> </ul> <p>The correct setting to use depends on the nature of the transformation. Try each option to see which works best with your footage.</p>                                                                                                                                                                 |

| Control (UI)             | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                  |               |  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Different Clip</b> .                                                                                                                                                                                                            |
| Iterations               | iterations       | 6             | <p>The number of refinement passes. Higher values can produce a better color match, but also take longer to process.</p>  <b>Note:</b> This control is only available when <b>Task</b> is set to <b>Match Different Clip</b> .                                                                                   |
| Analyze Reference Frames | analyzeRefFrames | N/A           | <p>Click this to calculate the grade.</p>  <b>Note:</b> This control is only available when you have set at least one reference frame.                                                                                                                                                                           |
| slope                    | slope            | N/A           | <p>The slope value of the CDL transform. If you're not happy with the value MatchGrade calculates automatically, you can use this to fine-tune the results.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> . |
| lock                     | lockSlope        | disabled      | <p>Lock the <b>slope</b> value to prevent MatchGrade from recalculating it when <b>Recalculate CDL</b> is pressed.</p>                                                                                                                                                                                                                                                                            |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> .                                                                                                                                                                   |
| offset       | offset           | N/A           | <p>The offset value of the CDL transform. If you're not happy with the value MatchGrade calculates automatically, you can use this to fine-tune the results.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> .  |
| lock         | lockOffset       | disabled      | <p>Lock the <b>offset</b> value to prevent MatchGrade from recalculating it when <b>Recalculate CDL</b> is pressed.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> .                                         |
| power        | power            | N/A           | <p>The power value of the CDL transform. If you're not happy with the value MatchGrade calculates automatically, you can use this to fine-tune the results.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> . |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lock         | lockPower        | disabled      | <p>Lock the <b>power</b> value to prevent MatchGrade from recalculating it when <b>Recalculate CDL</b> is pressed.</p> <div>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b>. </div>                                               |
| saturation   | saturation       | N/A           | <p>The saturation value of the CDL transform. If you're not happy with the value MatchGrade calculates automatically, you can use this to fine-tune the results.</p> <div>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b>. </div> |
| lock         | lockSaturation   | disabled      | <p>Lock the <b>saturation</b> value to prevent MatchGrade from recalculating it when <b>Recalculate CDL</b> is pressed.</p> <div>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b>. </div>                                        |
| error        | cdlError         | N/A           | <p>Displays the error for the CDL transform. The smaller the value, the better the results.</p> <p>This value cannot be edited.</p>                                                                                                                                                                                                                                                                              |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               |  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> .                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Recalculate CDL | calculateCDL     | N/A           | <p>Click this to recalculate the CDL transform that best fits the 3D LUT. <b>CDL Output</b> values that have <b>lock</b> enabled are not recalculated.</p> <p>This allows you to manually set some values and automatically estimate others. For example, you can adjust and lock <b>slope</b> and <b>offset</b> and then click this button to automatically recalculate <b>power</b> and <b>saturation</b>.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>CDL</b> and you have clicked <b>Analyze Reference Frames</b> . |
| Export          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| LUT output file | outfile          | N/A           | <p>The file path and name of the 3D LUT file to export. The file extension is <b>.csp</b>.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>3D LUT</b> and you have clicked <b>Analyze Reference Frames</b> .                                                                                                                                                                                                                                                                                                              |
| Write           | writelut         | N/A           | <p>Click this to export the 3D LUT to the <b>.csp</b> file specified in the <b>LUT output file</b> field.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)                                                                                                                                           | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                          |               |  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>3D LUT</b> and you have clicked <b>Analyze Reference Frames</b> .                                                                                                                                                                                                                                                                                                                                                                                                     |
| Create OCIOFile-Transform                                                                                                                              | createOCIOFile-Transform | N/A           | <p>Click this to create an <a href="#">OCIOFileTransform</a> node that you can use elsewhere in the script to apply the same grade.</p>  <b>Note:</b> This control is only available when <b>Transform</b> is set to <b>3D LUT</b> and you have clicked <b>Analyze Reference Frames</b> .                                                                                                                                                                                                                                                             |
| Create OCIOCDL-Transform                                                                                                                               | createOCIOCDL-Transform  | N/A           | <p>Click this to create an <a href="#">OCIOFileTransform</a> node that you can use elsewhere in the script to apply the same grade. The button behaves differently depending on the <b>Transform</b> control's setting:</p> <ul style="list-style-type: none"> <li>• <b>3D LUT</b> - Use the <b>LUT output file</b> and <b>Write</b> controls to write the LUT to a <b>.csp</b> file and then click <b>Create OCIOFileTransform</b> to create an OCIOFileTransform node that applies the grade.</li> <li>• <b>CDL</b> - Click <b>Create OCIOCDLTransform</b> to create an OCIOCDLTransform node that applies the CDL grade.</li> </ul> |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| before render                                                                                                                                          | beforeRender             | none          | These functions run prior to starting rendering in <code>execute()</code> . If they throw an exception, the render aborts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| before each frame                                                                                                                                      | beforeFrameRender        | none          | These functions run prior to starting rendering of each individual frame. If they throw an                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | exception, the render aborts.                                                                                                                        |
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |

# MinColor

Calculates the difference between the darkest value in the input image and the **target** value, and then adds the result to the image. This sets the darkest pixel to the **target** value.

To have MinColor calculate the darkest pixels and remember them, click **Find Pixel Delta**.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The image sequence to which the minimum is applied. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                |
|--------------|------------------|---------------|---------------------------------------------------------|
| MinColor Tab |                  |               |                                                         |
| search       | channels         | rgb           | Only these channels are searched for the minimum value. |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                   |               | If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                     |
| modify                                                                                                                                                 | modify            | all           | <p>Sets the channels to which the calculated delta is added.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                              |
| target                                                                                                                                                 | target            | 0.095         | Sets the value to add to the calculated darkest pixel from the input image. This sets the darkest pixel in the image to the <b>target</b> value.                                                                                                                                                                                                               |
| direction                                                                                                                                              | adjdir            | Up            | <p>Sets the conditions under which the image is modified:</p> <ul style="list-style-type: none"> <li>• <b>Up</b> - only apply changes if the calculated delta is positive.</li> <li>• <b>Down</b> - only apply changes if the calculated delta is negative.</li> <li>• <b>Both</b> - apply changes if the calculated delta is positive or negative.</li> </ul> |
| delta                                                                                                                                                  | pixeldelta        | 0             | Displays the calculated pixel delta value.                                                                                                                                                                                                                                                                                                                     |
| Find Pixel Delta                                                                                                                                       | N/A               | N/A           | Click to calculate the pixel delta for all or some frames.                                                                                                                                                                                                                                                                                                     |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                                                                                |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                                                                                   |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                                                                                                                                       |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |

# Multiply

Lets you multiply a channel's values by a given factor, which has the effect of lightening the channel while preserving the black point. This operation is also known as gain.

See also [ColorCorrect](#) and [Grade](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose channel values you want to multiply.                                                                                                                                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the multiplication is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                      |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Multiply Tab   |                  |               |                                                                                                                                                                                                               |
| channels       | channels         | all           | <p>The multiplication is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| value          | value            | 0             | The factor by which you want to multiply the values in the above channels.                                                                                                                                    |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                 |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the multiplication is limited to the non-black areas of this channel.                                                                                               |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                  |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the multiplication is limited to the non-white areas of the mask.                                                                                                 |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                           |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                      |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may</p>                                              |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the gain adjustment before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                    |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full multiplication effect at 1.                                                                                                                                                                                                                                                                                                                                                 |

# OCIOCDLTransform

Applies an ASC CDL (American Society of Cinematographers Color Decision List) grade based on the OpenColorIO Library. For more information, see <https://opencolorio.org>.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
 <install\_directory>/Documentation/NDKExamples/Plugins/00b\_8source.html

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the CDL transform.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the CDL transform is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                   |
|----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OCIOCDLTransform Tab |                  |               |                                                                                                                                                                                                                            |
| channels             | channels         | rgb           | <p>The CDL transform is applied only to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>               |
| slope                | slope            | 1             | Adjusts the gain for the entire image.                                                                                                                                                                                     |
| offset               | offset           | 0             | Adjusts the offset for the entire image.                                                                                                                                                                                   |
| power                | power            | 1             | Adjusts the gamma for the entire image.                                                                                                                                                                                    |
| saturation           | saturation       | 1             | Adjusts the saturation for the entire image.                                                                                                                                                                               |
| direction            | direction        | forward       | Select <b>Inverse</b> to invert the transform.                                                                                                                                                                             |
| working space        | working_space    | linear        | Sets the color space in which the file is applied. The input is transformed from scene linear to the selected working space, the file color transform is applied, and then the result is transformed back to scene linear. |
| read from file       | read_from_file   | disabled      | Enable this to load color correction information from a .cc or .ccc file.                                                                                                                                                  |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                              |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| file                | file             | none          | The ASC CDL file to use for the transform. This can be a .cc or .ccc file.                                                                                                                                                            |
| cccid               | cccid            | none          | If the ASC CDL file is a .ccc (Color Correction Collection) file, specify the cccid to look up here.                                                                                                                                  |
| select cccid        | select_cccid     | N/A           | Click to open the cccid dialog and select the cccid from the dropdown menu.<br><br>You can view the <b>Slope, Offset, Power</b> and <b>Saturation</b> settings for the chosen .ccc from within this dialog. These cannot be modified. |
| export grade as .cc | export_cc        | N/A           | Exports the grade as a .cc (Color Correction) file.                                                                                                                                                                                   |
| mask                | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                         |
|                     | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                |
| inject              | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                          |
| invert              | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask                                                                                                                   |
| fringe              | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                          |
| (un)premult by      | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

# OCIOColorSpace

Much like the standard ColorSpace node, you can use the OCIOColorSpace node for converting an image sequence from one colorspace to another. The OCIOColorSpace node is based on the OpenColorIO library. For more information, see <https://opencolorio.org>.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace transform.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace transform is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                        |
|--------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OCIOColorSpace Tab |                  |               |                                                                                                                                                                                                                                                                                                                 |
| channels           | channels         | rgb           | <p>The ColorSpace transform is applied only to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                             |
| input              | in_colorspace    | linear        | <p>Specifies the colorspace of your input image.</p> <div>  <p><b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.</p> </div> |
| output             | out_colorspace   | linear        | Specifies the colorspace you want to convert the image to.                                                                                                                                                                                                                                                      |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                  |               |  <b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.                                                                                                                                                                                                                                |
| swap input/output | swap             | n/a           | Swaps the selected <b>input</b> and <b>output</b> colorspace knobs. This can be useful if you're doing certain comp tasks that work better in certain colorspace, such as grading. For example, you might go from <b>ACEScc</b> (input) to <b>scene_linear</b> (output) in a OCIOColorspace node, perform a Grade node adjustment, copy the first Colorspace node after the Grade node, and click the <b>swap input/output</b> button to go back to <b>ACEScc</b> . |
| mask              | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                       |
|                   | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                              |
| inject            | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                        |
| invert            | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                |
| fringe            | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                 |
| (un)premult by    | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|              | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Context Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key1         | key1             | n/a           | <p>Allows you to add variables to register certain viewer processes by creating a custom <b>config.ocio</b> and specifying the variable in the <b>to_reference</b> file transform.</p> <p>See Nuke's <a href="#">online help</a> for more information.</p>                                                                                                                                                                                                                                                                                                                                    |
| value1       | value1           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key2         | key2             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value2       | value2           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key3         | key3             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value3       | value3           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key4         | key4             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value4       | value4           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

# OCIODisplay

Uses the OpenColorIO library to apply a colorspace conversion to an image sequence, so that it can be accurately represented on a specific display device. The OCIODisplay node is based on the OpenColorIO library. For more information, see <https://opencolorio.org>.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                               |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------|
| OCIODisplay Tab  |                  |               |                                                                                        |
| input colorspace | colorspace       | linear        | Specifies in the colorspace of your input sequence.                                    |
| display device   | display          | default       | Specifies the colorspace of the display device that will be used to view the sequence. |



| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                            |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| view transform   | view             | sRGB          | Specifies the colorspace transform to apply to the scene or image.                                                                                                                                                                                  |
| invert direction | invert           | disabled      | Select <b>invert direction</b> to invert the transform.                                                                                                                                                                                             |
| gain             | gain             | 1             | Set the amount of exposure adjustment applied before the display transform.                                                                                                                                                                         |
| gamma            | gamma            | 1             | Set the amount of gamma correction applied after the display transform.                                                                                                                                                                             |
| saturation       | saturation       | 1             | Set the amount of saturation adjustment applied before the display transform.                                                                                                                                                                       |
| channel view     | channel_selector | RGB           | Specifies the channels to view before the display transform.                                                                                                                                                                                        |
| layer            | layer            | rgba          | Specifies the layer to process. This should be a layer with RGB data.                                                                                                                                                                               |
| Context Tab      |                  |               |                                                                                                                                                                                                                                                     |
| key1             | key1             | n/a           | Allows you to add variables to register certain viewer processes by creating a custom <b>config.ocio</b> and specifying the variable in the <b>to_reference</b> file transform.<br><br>See Nuke's <a href="#">online help</a> for more information. |
| value1           | value1           | n/a           |                                                                                                                                                                                                                                                     |
| key2             | key2             | n/a           |                                                                                                                                                                                                                                                     |
| value2           | value2           | n/a           |                                                                                                                                                                                                                                                     |
| key3             | key3             | n/a           |                                                                                                                                                                                                                                                     |
| value3           | value3           | n/a           |                                                                                                                                                                                                                                                     |
| key4             | key4             | n/a           |                                                                                                                                                                                                                                                     |
| value4           | value4           | n/a           |                                                                                                                                                                                                                                                     |

# OCIOFileTransform

Uses the OpenColorIO library to load a colorspace conversion from a file (usually a 1D or 3D LUT) and apply it. You can also load other file-based transformations, for example an ASC ColorCorrection XML. File transforms are applied without any input or output colorspace handling. If the file expects log-encoded pixels, but you apply the node to a linear image, you will get incorrect results. The OCIOFileTransform node is based on the OpenColorIO library.

For more information, see: <https://opencolorio.org>



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                                        |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled <b>mask</b>. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                              |
|-----------------------|------------------|---------------|-------------------------------------------------------|
| OCIOFileTransform Tab |                  |               |                                                       |
| channels              | channels         | rgb           | The file transform is applied only to these channels. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                                                                                                                                                                            |
| file         | file             | none          | <p>The file to use for the transform. Supported formats:</p> <ul style="list-style-type: none"> <li>• .3dl (Flame)</li> <li>• .3dl (Lustre)</li> <li>• .ccc (ColorCorrectionCollection)</li> <li>• .cc (ColorCorrection)</li> <li>• .csp (Cinespace)</li> <li>• .lut (Houdini)</li> <li>• .itx (Iridas_itx)</li> <li>• .cube (Iridas_cube)</li> <li>• .mga (Pandora_mga)</li> <li>• .m3d (Pandora_m3d)</li> <li>• .spi1d (spi1d)</li> <li>• .spi3d (spi3d)</li> <li>• .spimtx (spimtx)</li> <li>• .cub (Truelight)</li> <li>• .vf (Nukevf)</li> </ul> |



**Note:** FilmLight and Foundry have elected to no longer bundle Truelight as of Nuke 11. The Truelight node has been superseded by the free version of Baselight for Nuke which itself can import a BLG (Basilight Linked Grade) that can contain a Truelight strip, plus optionally a lot more in terms of creative grading intent. Together with OpenColorIO and the native Nuke Vectorfield node we feel all the Nuke color management issues for which the Truelight node was originally intended are now addressed.

For further information on Baselight for Nuke, please contact [plugin-support@filmlight.ltd.uk](mailto:plugin-support@filmlight.ltd.uk)

|                  |               |          |                                                         |
|------------------|---------------|----------|---------------------------------------------------------|
| invert direction | invert        | disabled | Select <b>invert direction</b> to invert the transform. |
| interpolation    | interpolation | linear   | Specifies the interpolation method. This is ignored if  |

| Control (UI)   | Knob (Scripting) | Default Value         | Function                                                                                                                                                                                                                                                          |
|----------------|------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |                       | <p>the file used is not a LUT. The following interpolation methods are listed from fastest to most accurate:</p> <ul style="list-style-type: none"> <li>• <b>nearest</b></li> <li>• <b>linear</b></li> <li>• <b>tetrahedral</b></li> <li>• <b>best</b></li> </ul> |
| working space  | working_space    | scene_linear (linear) | Sets the color space in which the file is applied. The input is transformed from scene linear to the specified <b>working space</b> , the file color transform is applied, and then the result is transformed back to scene linear.                               |
| mask           | N/A              | disabled              | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                     |
|                | maskChannelInput | none                  | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                            |
| inject         | inject           | disabled              | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                      |
| invert         | invert_mask      | disabled              | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                              |
| fringe         | fringe           | disabled              | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                               |
| (un)premult by | N/A              | disabled              | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

# OCIOLogConvert

Sometimes log data is required for certain processing operations, like plate resizing or pulling keys. Usually a colorspace is provided specifically for these operations. The OCIOLogConvert node uses the OpenColorIOlibrary to convert from compositing\_log to scene\_linear, or the reverse. For more information, see <https://opencolorio.org>.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                                       |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace transform is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled <b>mask</b>. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                          |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OCIOLogConvert Tab |                  |               |                                                                                                                                                                                                                                                   |
| channels           | channels         | rgb           | <p>The colorspace conversion is applied only to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                              |
| operation          | operation        | log to lin    | <p>Specifies the operation to perform:</p> <ul style="list-style-type: none"> <li>• <b>log to lin</b> - Performs a log to linear colorspace conversion.</li> <li>• <b>lin to log</b> - Performs a linear to log colorspace conversion.</li> </ul> |
| mask               | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                     |
|                    | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                            |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# OCIOLookTransform

OCIOLookTransform applies a creative colorspace transform using a predefined look in the OCIO config file. A look is a named color transform intended to modify the 'look' of an image in a creative way, rather than a technically or mathematically defined colorspace conversion. Examples of looks include a neutral grade applied to film scans prior to VFX work and per-shot digital intermediate (DI) grades required by the director's vision applied before a Viewer transform, such as rec1886.

OCIOLooks are predefined in OCIO config files before use and often reference per-shot or per-sequence LUTs or color corrections (CC). See <https://opencolorio.org/> for more information on look configuration examples.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function |
|-----------------------|------------------|---------------|----------|
| OCIOLookTransform Tab |                  |               |          |



| Control (UI) | Knob (Scripting) | Default Value         | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels     | channels         | rgb                   | <p>The colorspace conversion is applied only to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| input        | in_colorspace    | scene_linear (linear) | <p>Specifies the input colorspace.</p> <div>  <p><b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| look         | look             | N/A                   | <p>Specifies the look to apply as defined in the OCIO config file. You can specify a single look or multiple looks using the following syntax:</p> <ul style="list-style-type: none"> <li>• Multiple looks are combined with , (comma): 'a,b'</li> <li>• Direction is specified with +/- prefixes for forward and inverse: '+a, -b'</li> <li>• Missing look fallbacks are specified with   (pipe): 'a, -b,   -b'</li> </ul> <div>  <p><b>Note:</b> ACES 1.3 OCIO configs include a <b>Reference Gamut Compression</b> look designed to correct wide gamut errors. This is the only look defined in the ACES 1.3 OCIO configs that ship with Nuke, so it is applied automatically. If more than one look is defined in the config, you can pick the look to apply using the <b>look</b> dropdown.</p> </div> |
| reload       | reload           | N/A                   | Click to reload all files used in the specified look(s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| invert       | invert           | disabled              | Select <b>invert direction</b> to invert the transform.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)   | Knob (Scripting) | Default Value         | Function                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| direction      |                  |                       |                                                                                                                                                                                                                                                                                                                           |
| output         | out_colorspace   | scene_linear (linear) | <p>Specifies the output colorspace to which the input is converted.</p> <div>  <b>Note:</b> The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release. </div> |
| ignore errors  | ignore_errors    | disabled              | When enabled, transforms that cannot locate a look defined in the OCIO config file are treated as a normal colorspace conversion from the <b>input</b> to the <b>output</b> colorspace specified.                                                                                                                         |
| mask           | N/A              | disabled              | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                             |
|                | maskChannelInput | none                  | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                                                                                    |
| inject         | inject           | disabled              | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                              |
| invert         | invert_mask      | disabled              | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                      |
| fringe         | fringe           | disabled              | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                       |
| (un)premult by | N/A              | disabled              | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to                                                                                                                                                                                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <b>none.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|              | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Context Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key1         | key1             | n/a           | <p>Allows you to add variables to register certain viewer processes by creating a custom <b>config.ocio</b> and specifying the variable in the <b>to_reference</b> file transform.</p> <p>See Nuke's <a href="#">online help</a> for more information.</p>                                                                                                                                                                                                                                                                                                                                    |
| value1       | value1           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key2         | key2             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value2       | value2           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key3         | key3             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value3       | value3           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| key4         | key4             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| value4       | value4           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

# OCIONamedTransform

OCIONamedTransform uses the new **NamedTransforms** in the OCIO configs shipped with Nuke to emulate older methods of color management that ignored the RGB primaries and simply applied one-dimensional transformations. These NamedTransforms have been added to the config as sometimes it is helpful to include one or more transforms in a config that are essentially stand-alone transforms that do not have a fixed relationship to a reference space or a process space. An example would be a utility curve transform where the intent is to simply apply a LUT1D without any conversion to a reference space.



**Note:** There are a number of NDK examples covering OCIO workflows that ship with the Nuke developer documentation, which can be found here:  
`<install_directory>/Documentation/NDKExamples/Plugins/00b_8source.html`

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the colorspace conversion.                                                                                                                                                                                                                                                                                                                                        |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled <b>mask</b>. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                          |
|------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------|
| OCIONamedTransform Tab |                  |               |                                                                                                                                   |
| channels               | channels         | rgb           | <p>The transform is applied only to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>,</p> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                     |
| named transform | named_transform  | none          | <p>Sets the named transform to apply to the input image. Select the family name first and then transform from the dropdown. For example, <b>Input &gt; ARRI &gt; LogC3 - Curve (EI800)</b>.</p> <p>The transforms available are contained in the selected OCIO config file under the <b>named_transforms:</b> section.</p> |
| mask            | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                              |
|                 | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                                                                                     |
| inject          | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                               |
| invert          | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                                                                       |
| fringe          | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                        |
| (un)premult by  | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                   |
|                 | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the color conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full transform at 1.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Context Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| key1         | key1             | n/a           | <p>Allows you to add variables to register certain viewer processes by creating a custom <b>config.ocio</b> and specifying the variable in the <b>to_reference</b> file transform.</p> <p>See Nuke's <a href="#">online help</a> for more information.</p>                                                                                                                                                                                                                               |
| value1       | value1           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| key2         | key2             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| value2       | value2           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| key3         | key3             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| value3       | value3           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| key4         | key4             | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| value4       | value4           | n/a           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# PLogLin

Converts between logarithmic and linear encoding (colorspace) based on a single gray point rather than the standard Cineon formula with a black point and white point (the formula that the [Log2Lin](#) node uses). This method is frequently referred to as *Josh Pines log conversion*.

Like the Log2Lin node, you can use this node to override Nuke's default Cineon-conversion. When doing so, ensure that the Read or Write node is not applying an automatic colorspace conversion based on its assumptions about the file format. You can do this by setting **colorspace** on the Read or Write to **linear** or enabling its **raw** option. PLogLin uses the formula posted on the EXR list at:

<http://lists.gnu.org/archive/html/openexr-devel/2005-03/msg00006.html>

See also [Log2Lin](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <ul style="list-style-type: none"> <li>• If you are using this node to convert your input file to linear, attach the Read node here.</li> <li>• If you are using this node to convert to logarithmic for output, attach the node whose result you want to output here.</li> </ul>                                                                                                      |
|                 | mask            | <p>An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |
| Output          |                 | <ul style="list-style-type: none"> <li>• If you are using this node to convert your input file to linear, attach any nodes you want to use to process the image here.</li> <li>• If you are using this node to convert to logarithmic for output, attach the Write node here.</li> </ul>                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PLogLin Tab  |                  |               |                                                                                                                                                                                                               |
| channels     | channels         | all           | <p>The PLogLin effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                    |
|------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| operation              | operation        | log to lin    | Select the operation you want the node to perform: <ul style="list-style-type: none"> <li>• <b>log to lin</b> - convert the input from logarithmic to linear colorspace.</li> <li>• <b>lin to log</b> - convert the input from linear to logarithmic colorspace.</li> </ul> |
| linear reference value | linref           | 0.18          | Set this to the linear value that corresponds with the <b>log reference value</b> .<br><br>For example, you could leave this at 0.18 (mid-gray) and enter the logarithmic value that corresponds with 0.18 in the <b>log reference value</b> field.                         |
| log reference value    | logref           | 445           | Set this to the logarithmic value that corresponds with the <b>linear reference value</b> .                                                                                                                                                                                 |
| negative gamma         | ngamma           | 0.6           | The film response gamma value.                                                                                                                                                                                                                                              |
| density per code value | density          | 0.002         | The change in the negative gamma for each log space code value.                                                                                                                                                                                                             |
| mask                   | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                               |
|                        | maskChannelInput | none          | The channel to use as a mask. By default, the colorspace conversion is limited to the non-black areas of this channel.                                                                                                                                                      |
| inject                 | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                |
| invert                 | invert_mask      | disabled      | Inverts the use of the mask channel so that the colorspace conversion is limited to the non-white areas of the mask.                                                                                                                                                        |
| fringe                 | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the colorspace conversion before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full colorspace conversion at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

# Posterize

Posterize reduces the color resolution of an image. This creates abrupt changes from one tone to another, producing a dramatic graphic effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to posterize.                                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, the posterize effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Posterize Tab |                  |               |                                                                                                                                                                                                                 |
| channels      | channels         | all           | <p>The posterize effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| Colors        | Colors           | 16            | The bit depth to use. For example, setting this control to 8 independently limits each affected channel to 256 colors.                                                                                          |
| mask          | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                   |
|               | maskChannelInput | none          | The channel to use as a mask. By default, the posterize effect is limited to the non-black areas of this channel.                                                                                               |
| inject        | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the posterize effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the posterization before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full posterize effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

# RolloffContrast

Applies a contrast curve, with smooth falloff at the low and high ends, equally across all channels in the input image. The **center** value controls the overall brightness of the colors and the **contrast** value increases or decreases the contrast of the image. Use **soft clip** to control the amount of rolloff and check **override values** to adjust the tension and extent of the **soft clip** curve.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the rolloff.                                                                                                                                                                                                                                                                                                                                         |
|                 | mask            | <p>An optional image to use as a mask. By default, the contrast changes are limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|---------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RolloffContrast Tab |                  |               |                                                                                                                                                                                                       |
| channels            | channels         | rgba          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| range               | range            | 1             | Values between 0 and the input value use a lookup table to reduce processing time.                                                                                                                    |
| contrast            | contrast         | 1             | Higher values increase the contrast. Values closer to 0 reduce the contrast.                                                                                                                          |
| center              | center           | 0.5           | The <b>center</b> value is located at the center of the contrast curve by default and controls the overall brightness of the colors.                                                                  |
| soft clip           | soft_clip        | 0             | The amount of roll off from the linear curve near the ends, softening the effect of the contrast.                                                                                                     |
| override values     | value_override   | disabled      | If enabled, custom values below override the computed values.                                                                                                                                         |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                  |
|----------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| slope mag 1 low shoulder   | slope_mag_low1   | 0.80000001    | A value from 0 to 1 that controls where the interior control points are in the bezier.                                                                    |
| slope mag 2 low shoulder   | slope_mag_low2   | 0.0025        | A value from 0 to 1 that controls where the interior control points are in the bezier.                                                                    |
| blank point percentage     | black_low        | 1             | A value from 0 to 1 that controls the location of the black point. Computed as the distance between the origin and the contrast line zero crossing.       |
| slope mag 1 upper shoulder | slope_mag_high1  | 1             | A value from 0 to 1 that controls where the interior control points are in the upper bezier.                                                              |
| slope mag 2 upper shoulder | slope_mag_high2  | 0.80000001    | A value from 0 to 1 that controls where the interior control points are in the upper bezier.                                                              |
| white point percentage     | white_high       | 1             | A value from 0 to 1 that controls the location of the white point. Computed as the distance between the 1,1 point and the contrast line $y = 0$ crossing. |
| mask                       | N/A              | disabled      | Enable the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                              |
|                            | maskChannelInput | none          | The channel to use as a mask. By default, the contrast effect is limited to the non-black areas of this channel.                                          |
| inject                     | inject           | disabled      | Copy the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                |
| invert                     | invert_mask      | disabled      | Invert the use of the mask channel, so that the contrast effect is limited to the non-white areas of the mask.                                            |
| fringe                     | fringe           | disabled      | Blur the edges of the mask.                                                                                                                               |
| (un)premult by             | N/A              | disabled      | Enable the associated channel to the right. Disabling this checkbox is the same as setting the channel to                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <b>none.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|              | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate adjusting the contrast before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert       | invert_unpremult | disabled      | Invert the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| mix          | mix              | 1             | Dissolve between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

# Sampler

This node converts a horizontal scanline of pixel data into a lookup curve. The Viewer **sampler** widget or **sampler y** coordinate selects the scanline (**sampler x** is ignored).

The Sampler node can be useful for visualizing the effects of color corrections on the image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | unnamed         | The image sequence from which the sample is taken. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                    |
|----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sampler Tab          |                  |               |                                                                                                                                                                                                                                                                             |
| channels             | channels         | rgb           | <p>Lookup curves are only generated for these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                |
| sampler xy           | sampler          | 0, 0          | <p>Sets the position of the sampler widget that determines the scanline to convert into a lookup curve.</p> <div>  <b>Note:</b> The <b>sampler x</b> coordinate is ignored.         </div> |
| normalize x          | normalize_x      | enabled       | When enabled, the lookup curves are normalized.                                                                                                                                                                                                                             |
| Sample current frame | sample_current   | N/A           | Click to sample the current frame and update the lookup curve output for the current sampler point.                                                                                                                                                                         |
| [lookup curves]      | lut              | N/A           | Displays the scanline specified by the <b>sampler y</b> coordinate as lookup curves. You can also view individual pixel values by mousing over the Viewer.                                                                                                                  |

# Saturation

For the times when you just want to correct an image's saturation (color intensity) and don't require limiting the correction to any particular range of hues, use the Saturation node.

If you do want to adjust the levels of saturation in a range of hues (for example, to diminish green, blue, or redscreen spill), use the [HueCorrect](#) node instead.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose saturation you want to adjust.                                                                                                                                                                                                                                                                                                                                |
|                 | mask            | <p>An optional image to use as a mask. By default, the saturation adjustment is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                          |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Saturation Tab |                  |               |                                                                                                                                                   |
| channels       | channels         | all           | <p>The saturation adjustment is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p> |
| saturation     | saturation       | 1             | <p>Sets the saturation for the input image.</p> <p>A value of 1 equals no change. A value of 0 produces a grayscale image.</p>                    |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                     |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the saturation adjustment is limited to the non-black areas of this channel.                            |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.      |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the saturation adjustment is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate adjusting the saturation before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full saturation adjustment at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# SoftClip

Compresses high-dynamic-range (HDR) imagery into the 0-1 range. Because simple color compression changes the apparent chroma and contrast of the image, the **conversion** control allows for several compression modes that try to preserve colors.

## Inputs and Controls

| Connection Type | Connection Name | Function                                               |
|-----------------|-----------------|--------------------------------------------------------|
| Input           | unnamed         | The HDR image sequence to compress into the 0-1 range. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SoftClip Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| conversion   | conversion       | none          | <p>Sets the color compression mode:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no compression is applied.</li> <li>• <b>preserve hue and brightness</b> - if r, g, or b are greater than <b>softclip max</b>, the saturation is reduced to get it below <b>softclip max</b> while preserving the brightness.</li> <li>• <b>preserve hue and saturation</b> - if r, g, or b are greater than <b>softclip max</b>, the brightness is reduced to get it below <b>softclip max</b>.</li> <li>• <b>logarithmic compress</b> - compress all components between <b>softclip min</b> and <b>max</b> through a logarithmic curve between <b>softclip min</b> and 1.0.</li> </ul> |
| softclip min | softclip_min     | 0.8           | <p>Sets the lower clipping limit. All values above <b>softclip min</b> are compressed.</p> <div>  <b>Note:</b> When using <b>logarithmic compress</b>, this value should be set to 0 or 1 to avoid artefacts for high <b>softclip max</b> values. </div>                                                                                                                                                                                                                                                                                                                                             |
| softclip max | softclip_max     | 1             | <p>Sets the upper clipping limit. RGB values between <b>softclip min</b> and this value are compressed to be between <b>softclip min</b> and 1.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

# Toe

Toe lifts the black level, in a similar way to gain controls in other color correction nodes, but with a rolloff so that whites are mostly not affected. This makes the shadows in your image lighter.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence whose black levels you want to lift.                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, the color correction is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled <b>mask</b>. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Toe Tab      |                  |               |                                                                                                                                              |
| channels     | channels         | rgb           | <p>The color correction is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p> |
| lift         | lift             | 0             | Changes the black values to this value, without affecting any original white values of the image.                                            |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the color                                                                                          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | correction is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| invert         | invert           | disabled      | Inverts the use of the mask channel so that the color correction is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to none.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | unpremult        | none          | The image is divided by this channel before being processed, and multiplied again afterwards.<br><br>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate applying the color correction before the premultiplication was done. It is the same as adding an Unpremult node before this node and a Premult node after, but allows you to work faster if you're only using one color correct node.<br><br>If you are using unpremultiplied input images, you should leave this set to <b>none</b> . |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full color correction at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

# Truelight

FilmLight and Foundry have elected to no longer bundle Truelight as of Nuke 11. The Truelight node has been superseded by the free version of Baselight for Nuke which itself can import a BLG (Baselight Linked Grade) that can contain a Truelight strip, plus optionally a lot more in terms of creative grading intent. Together with OpenColorIO and the native Nuke Vectorfield node we feel all the Nuke color management issues for which the Truelight node was originally intended are now addressed.

For further information on Baselight for Nuke, please contact [plugin-support@filmlight.ltd.uk](mailto:plugin-support@filmlight.ltd.uk)

# Vectorfield

Vectorfield applies color values from lookup tables (LUTs), allowing you to make complex color corrections quickly using pre-calculated files. You can create LUT files using the [GenerateLUT](#) node or a third-party application capable of producing a LUT format the Vectorfield node supports.

For more information, see [CMSTestPattern](#) and [GenerateLUT](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the color correction. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                             |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------|
| Vectorfield Tab  |                  |               |                                                                                      |
| vectorfield file | vfield_file      | none          | The path and file name of the LUT file that describes the color correction to apply. |
| reload           | reload           | N/A           | Reloads the <b>vectorfield file</b> .                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| file type    | file_type        | auto          | <p>The file format of the LUT file to apply. The following file extensions are recognized:</p> <ul style="list-style-type: none"> <li>• <b>auto</b> - Nuke attempts to guess the file type from the <b>vectorfield file</b>'s extension.</li> <li>• <b>.3dl</b> - Autodesk and ASSIMILATE Scratch LUT format (3D).</li> <li>• <b>.blut</b> - Side Effects Houdini binary LUT format (3D).</li> <li>• <b>.cms</b> - Light Illusion LightSpace CMS LUT format (1D and 3D).</li> <li>• <b>.csp</b> - Rising Sun Research CineSpace LUT format (3D).</li> <li>• <b>.cub</b> - FilmLight Truelight LUT format (1D and 3D).</li> <li>• <b>.cube</b> - IRIDAS LUT format (1D and 3D).</li> <li>• <b>.vf</b> - Nuke's native LUT format used by the Vectorfield node (3D).</li> <li>• <b>.vfz</b> - Gzip compressed .vf files.</li> </ul> |



**Note:** FilmLight and Foundry have elected to no longer bundle Truelight as of Nuke 11. The Truelight node has been superseded by the free version of Baselight for Nuke which itself can import a BLG (Basilight Linked Grade) that can contain a Truelight strip, plus optionally a lot more in terms of creative grading intent. Together with OpenColorIO and the native Nuke Vectorfield node we feel all the Nuke color management issues for which the Truelight node was originally intended are now addressed.

For further information on Baselight for Nuke, please contact [plugin-support@filmlight.ltd.uk](mailto:plugin-support@filmlight.ltd.uk)

|               |               |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|---------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| interpolation | interpolation | trilinear field | <p>If all possible input points and their values were stored in a 3D LUT, the LUT would soon become too large. To combat this, only some points and their values are sampled and saved and the rest are interpolated. This control lets you select the interpolation method to use:</p> <ul style="list-style-type: none"> <li>• <b>step field</b> - This returns the value of the nearest voxel with no interpolation. This option should only be used for testing, as it is likely to produce artifacts.</li> <li>• <b>linear staggered vector field</b> - Instead of having the</li> </ul> |
|---------------|---------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>color vectors stored in the center of each voxel, the components of the color vectors are treated as being stored on the faces of the voxels. This can be very useful in fluid simulation. However, unless you specifically generate the 3D LUT with this interpolation in mind, you should not use this option.</p> <ul style="list-style-type: none"> <li>• <b>trilinear field</b> - This is a smooth quasilinear interpolation between the nearest voxel neighbors to the queried point.</li> <li>• <b>cubic field</b> - This option is like <b>trilinear field</b> but uses a larger stencil and tries to interpolate more smoothly between values using cubic interpolation.</li> </ul> |
| GPU extrapolate | gpuExtrapolate   | enabled       | Controls whether the graphics processing unit (GPU) implementation extrapolates the grid values or clamps to the maximum value of the LUT. In most cases, this parameter should be on.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| colorspace in   | colorspaceIn     | linear        | <p>Determines how to convert from Nuke's linear colorspace to the input required by the 3D LUT:</p> <ul style="list-style-type: none"> <li>• linear</li> <li>• sRGB</li> <li>• rec709</li> <li>• Cineon</li> <li>• Gamma 1.8</li> <li>• Gamma 2.2</li> <li>• PanaLog</li> <li>• REDLog</li> <li>• ViperLog</li> <li>• AlexaV3LogC</li> <li>• PLogLin</li> <li>• SLog</li> <li>• REDSpace</li> </ul>                                                                                                                                                                                                                                                                                             |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                             |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------|
| colorspace out | colorspaceOut    | linear        | Determines how to convert from the 3D LUT's output to Nuke's linear colorspace. See colorspace in for the conversion type available. |

**3DL Settings** (These controls are only visible when you've selected **3dl** in the file type dropdown menu.)

|                         |                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|--------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| output bit depth (.3dl) | output_bitdepth_id | auto     | <p>Select the bit depth to scale output values for .3dl files. For instance, a 10 bit file will have values between 0 and 1023. In general this will match the input depth.</p> <ul style="list-style-type: none"> <li>• <b>auto</b> - use header information to determine the output bit depth and, failing that, use a heuristic to guess. The heuristic assumes no values are outside the range 0-1.</li> <li>• <b>inputbitdepth</b> - use the input bit depth.</li> <li>• <b>4 bit</b> - use a 4 bit depth.</li> <li>• <b>8 bit</b> - use an 8 bit depth.</li> <li>• <b>10 bit</b> - use a 10 bit depth.</li> <li>• <b>12 bit</b> - use a 12 bit depth.</li> <li>• <b>16 bit</b> - use a 16 bit depth.</li> </ul> |
| normalize output        | normalize_output   | disabled | <p>Normalize 3dl output values to the range 0-1. This is legacy behavior in Nuke which normalizes the output range if it exceeds 1. Where the output scale is incorrect, output bit depth should be used instead to scale the data.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3dl file format         | format_3dl_id      | auto     | <p>Select the format you want to use for your .3dl file.</p> <ul style="list-style-type: none"> <li>• <b>auto</b> - use header information to determine the format. Since it is not always possible to determine the format from the header, you should select the correct format where possible. The format can always be determined for files generated by Nuke.</li> <li>• <b>autodesk flame/smoke</b> - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65.</li> <li>• <b>autodesk lustre</b> - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65, and output a</li> </ul>                                                                                                                   |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                              |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>3DMESH/Mesh header.</p> <ul style="list-style-type: none"><li>• <b>assimilate scratch</b> - scale and offset the 3D LUT. This should be used only for legacy scratch files prior to Flame compatibility.</li></ul> |

# Filter Nodes

Filter nodes contain convolve filters, such as blur, sharpen, edge detect, and erode.

## Bilateral

A bilateral filter is a smoothing filter that is particularly good at preserving edges, though it can be computationally expensive.

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | guide           | <p>An optional image to compute color similarity while filtering.</p> <p>Connecting the <b>guide</b> input converts the output from the filter to the same format as the guide image, resulting in a joint bilateral resampling filter. If the source and <b>guide</b> images have the same format, the node acts as a cross bilateral filter.</p> <p>If the <b>guide</b> input is not connected, the output format is equal to that of the source input and acts as a standard bilateral filter.</p> |
|                 | mask            | <p>An optional image to use as a mask. By default, the filter effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p>                                                                                                                        |
|                 | unnamed         | The image sequence to filter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bilateral Tab        |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                                                                                                                                                                                               |
| Channels             | channels          | all           | The filter is only applied to these channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels.                                                                                                                                                                                                                                                                       |
| Guide Channels   | guide            | all           | <p>When the <b>guide</b> input is connected, sets the channels in the guide image used to compute the filtering weights.</p> <p>The guide image should contain some prior information on the source useful to the filtering, such as a <b>depth</b> channel. If no information is available, the result of an unguided C_Bilateral filter can be used as <b>guide</b> input of a second filtering operation.</p> |
| Size             | size             | 3             | Sets the height and width of the area within which pixels are compared to calculate the blur. Higher values widen the compare area, producing greater effect.                                                                                                                                                                                                                                                    |
| Positional Sigma | positionalSigma  | 0.4           | Controls the amount that nearby pixels affect the overall blur.                                                                                                                                                                                                                                                                                                                                                  |
| Colour Sigma     | colourSigma      | 0.4           | Controls the amount of blur that occurs over edges in the image, lower values preserve edges more reliably.                                                                                                                                                                                                                                                                                                      |
| Filter           | filter           | gaussian      | <p>Sets the type of color weighting applied to the output:</p> <ul style="list-style-type: none"> <li>• <b>gaussian</b> - weighted to differences in the surrounding pixel color and how close those pixels are to one another.</li> <li>• <b>median</b> - weighted according to the middle value pixel.</li> </ul>                                                                                              |
| Mask             | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                    |
|                  | maskChannelInput | none          | The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                   |
| Inject           | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b>                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | channel. Injecting the mask allows you to use the same mask further downstream.                                              |
| Invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter effect is limited to the non-white areas of the mask.                 |
| Fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| Mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                          |

# Blur

Adds blur to an image or matte using **box**, **triangle**, **quadratic**, or **gaussian** filter algorithms. The blur value is calculated for image pixels by examining their neighbors within the constraints of the **size** control (in pixels), and applying the selected algorithms. The default, **gaussian**, produces the smoothest blur, but takes longer to render.

You can also create this node by pressing **B** on the Node Graph.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to blur.                                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blur Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                  |
| channels     | channels         | all           | <p>The blur effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                       |
| size         | size             | 0             | Sets the radius within which pixels are compared to calculate the blur. Higher values widen the compare area, producing more blur.                                                                                                                                                                                                                               |
| filter       | filter           | gaussian      | <p>Select the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul> <div>  <b>Note:</b> Box blur is the fastest to render, whereas Gaussian blur is the smoothest.         </div> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| quality        | quality          | 15            | Controls the trade off between faster processing time at lower values, and smoothness at higher values.<br><br>The image is scaled down so the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering. |
| crop to format | crop             | enabled       | When enabled, the bounding box cannot grow past its incoming size. This avoids creating oversized bounding boxes that can take longer to compute.                                                                                                       |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                           |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.                                                                                                                                          |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                            |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter effect is limited to the non-white areas of the mask.                                                                                                                                            |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                            |
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full blur effect at 1.                                                                                                                                                                                |

# Bokeh

Bokeh is a plug-in originally developed by Peregrine Labs and acquired by Foundry in 2022. Bokeh was introduced natively to Nuke 14.0v2 and Nuke 13.2v6, and later releases of Nuke, NukeX, Nuke Studio, Nuke Indie, and Nuke Non-commercial to all customers with active licenses.

Bokeh defocuses an image according to a Z depth map, Deep data, or Camera information. You can control where the focal plane lies to focus on specific elements in an image and simulate real-world lenses. You can also control the shape of the defocus kernel using the Kernel input.



**Note:** You can defocus an image without using any additional depth data, but the result is uniformly defocused by the **Multiplier** control.



**Note:** The native version of Bokeh is backward compatible with version 1.4.8 of the pgBokeh plug-in. For older Nuke scripts containing legacy pgBokeh nodes, the pgBokeh nodes are automatically remapped to the Nuke-native Bokeh node. If the old pgBokeh plugin is still present in the Nuke plugin path, we recommend you remove it to ensure the native Bokeh node is used by Nuke.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Mattes          | <p>An optional input to use as a mask. By default, the effect is limited to the non-black areas of the mask.</p> <p>At first, the Mattes input appears as a triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the Mattes input, ensure that the <b>Default Matte Channel</b> control is disabled or set to <b>none</b>.</p> |
|                 | Deep Input      | An optional input to use Deep data as the depth channel.                                                                                                                                                                                                                                                                                                                                       |
|                 | Camera          | An optional input to use Camera node data to determine the focal plane.                                                                                                                                                                                                                                                                                                                        |
|                 | Kernel          | An optional input to control the shape of the defocus kernel. This input is only used when the <b>Kernel Type</b> is set to <b>Input</b> in the node properties.                                                                                                                                                                                                                               |
|                 | Input           | The image to which you want to apply the effect.                                                                                                                                                                                                                                                                                                                                               |



| Control (UI)   | Knob (Scripting) | Default Value   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bokeh Tab      |                  |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Bokeh Channels | bokehChannels    | rgba            | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Depth Channel  | depthChannel     | depth.Z         | <p>Specifies the input channel containing the depth map information.</p> <div>  <p><b>Note:</b> You can defocus an image without using any additional depth data, but the result is uniformly defocused by the <b>Multiplier</b> control.</p> </div>                                                                                                                                                                                                                                                                                                                         |
| Output Type    | outputType       | Defocused Image | <p>Sets the output type:</p> <ul style="list-style-type: none"> <li>• <b>Defocused Image</b> - displays the input image with the Bokeh effects applied.</li> <li>• <b>Lens Bloom</b> - displays just the bloom effect.</li> <li>• <b>Focal Distance Visualization</b> - preview the focal distance values. This option displays where your focus plane is located in the image: <ul style="list-style-type: none"> <li>• <b>Red</b> - the focal plane, where your image is fully in focus.</li> <li>• <b>Green</b> - areas of the image in front of the focal plane.</li> <li>• <b>Blue</b> - areas of the image behind the focal plane.</li> </ul> </li> </ul> |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <div>  <b>Tip:</b> Increasing the <b>Focus Region Size</b> can help differentiate between regions. </div> <ul style="list-style-type: none"> <li>• <b>Filter Shape</b> - preview the shape of the kernel.</li> <li>• <b>Focus Mattes</b> - Front/Back mattes for the focus.</li> </ul> |
| Focus Region Output | focusOutput      | Both          | <p>Sets whether the <b>Front</b>, <b>Back</b>, or <b>Both</b> focus regions are output to the Viewer.</p> <p>You can switch this control to just output the front or back regions to make adjustments to individual multipliers without taking the processing hit for both regions.</p>                                                                                   |
| Multiplier          | multiplier       | 1             | Sets the overall amount of defocus applied to the image.                                                                                                                                                                                                                                                                                                                  |
| Front Multiplier    | frontmultiplier  | 1             | Sets the amount of defocus applied to the front focus region in addition to the defocus applied by the <b>Multiplier</b> control.                                                                                                                                                                                                                                         |
| Back Multiplier     | backmultiplier   | 1             | Sets the amount of defocus applied to the back focus region in addition to the defocus applied by the <b>Multiplier</b> control.                                                                                                                                                                                                                                          |
| Depth Style         | depthStyle       | Real          | <p>Controls how the depth information is interpreted:</p> <ul style="list-style-type: none"> <li>• <b>Real</b> - uses real world values to calculate the defocus.</li> <li>• <b>1/z</b> - uses values similar to those</li> </ul>                                                                                                                                         |

| Control (UI)          | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                     |               | <p>output by ScanlineRender nodes to calculate the defocus.</p> <div>  <b>Note:</b> If you're using deep data, this control has no effect. </div>                                                                                                                                                                                                                                             |
| Focal Plane           | focalPlane          | 100           | <p>Controls the plane on which the image is totally in focus. Lower values move the plane towards the front of the image and higher values move the plane towards the back of the image.</p> <div>  <b>Note:</b> Set the <b>Output Type</b> to <b>Focal Distance Visualization</b> to see a representation of the focal plane in red and the front and back regions in green and blue. </div> |
| Focus Region Size     | focusRegionSize     | 1             | Controls the size of the plane totally in focus. Larger values increase the width of the plane.                                                                                                                                                                                                                                                                                                                                                                                  |
| Focus Region Falloff  | focusRegionFalloff  | Linear        | Sets the falloff applied between the focal plane and the front and back regions of the image.                                                                                                                                                                                                                                                                                                                                                                                    |
| Defocus Matte Channel | N/A                 | off           | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                    |
|                       | defocusMatteChannel | none          | The channel to use as a mask. By default, the defocus effect is limited to                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)                             | Knob (Scripting)                | Default Value | Function                                                                                                                                                                                                                            |
|------------------------------------------|---------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                                 |               | the non-black areas of this channel.                                                                                                                                                                                                |
| Normalize Visualization                  | normalizeVisualization          | on            | When <b>Output Type</b> is set to <b>Focal Distance Visualization</b> , color values in the output are limited to the 0-1 range when this control is enabled.                                                                       |
| Integrate Deep Front and Back Separately | integrateFrontAndBackSeperately | off           | When enabled, front and back deep data from the Deep input is integrated separately. If you notice artifacts in your output from deep data, try enabling this control to reduce the artifacts produced by simultaneous integration. |
| Lens Tab                                 |                                 |               |                                                                                                                                                                                                                                     |
| Real World Lens Simulation               | realWorldLens                   | off           | When enabled, you can use the <b>Lens</b> controls to match your physical lens characteristics, such as <b>Focal Length</b> and <b>Aperture</b> .<br><br>When disabled, the <b>Lens</b> controls have no effect.                    |
| Focal Length                             | focalLength                     | 35            | Sets the focal length of the physical lens you want to match when defocusing.                                                                                                                                                       |
| Aperture                                 | fStop                           | 6             | Sets the f-stop value for the physical lens you want to match when defocusing.                                                                                                                                                      |
| World Scale                              | worldScale                      | cm            | Sets the world scale units to use in the scene. Nuke doesn't rely on any particular unit, but applications such as Maya may default to <b>cm</b> .                                                                                  |
| World Scale Multiplier                   | worldScaleMultiplier            | 1             | Sets the multiplier applied to the <b>World Scale</b> . For example, if your                                                                                                                                                        |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                               |
|-----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | scene units are based on 10 cm blocks, you can set the <b>World Scale</b> to <b>cm</b> and the <b>World Scale Multiplier</b> to <b>10</b> to adjust the scene accordingly.                                                                                                                                             |
| Film Format           | filmFormat       | 35mm          | <p>Sets the filmback to use from a list of preset values, which automatically sets the <b>Aperture Width</b> and <b>Aperture Height</b> for the selected filmback.</p> <p>If you want to set the aperture manually, set <b>Film Format</b> to <b>Custom</b> and then enter the required aperture dimensions in mm.</p> |
| Aperture Width        | apertureWidth    | 22            | <b>Aperture Width</b> and <b>Aperture Height</b> are controlled by the selected <b>Film Format</b> .                                                                                                                                                                                                                   |
| Aperture Height       | apertureHeight   | 16            | If you want to set the aperture manually, set <b>Film Format</b> to <b>Custom</b> and then enter the required aperture dimensions in mm.                                                                                                                                                                               |
| Optical Artifacts Tab |                  |               |                                                                                                                                                                                                                                                                                                                        |
| Bloom                 | bloom            | 0             | <p>Controls the brightness of any bloom applied to the image when the <b>Bloom Threshold</b> is reached.</p> <p>Any pixels with a brightness less than the <b>Bloom Threshold</b> are not affected.</p>                                                                                                                |
| Curvature             | bloomCurvature   | 2             | Defines the physical lens curve, which affects the bloom differently depending where light enters the lens.                                                                                                                                                                                                            |
| Bloom Threshold       | bloomThreshold   | 0.7           | Controls the brightness level at which pixels are affected by the <b>Bloom</b> control.                                                                                                                                                                                                                                |

| Control (UI)                       | Knob (Scripting)              | Default Value | Function                                                                                                                                                                                                                                                                                                          |
|------------------------------------|-------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    |                               |               | Any pixels with a brightness less than the <b>Bloom Threshold</b> are not affected.                                                                                                                                                                                                                               |
| Bloom Matte Channel                | N/A                           | off           | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                     |
|                                    | bloomMatteChannel             | none          | The channel to use as a mask. By default, the bloom effect is limited to the non-black areas of this channel.                                                                                                                                                                                                     |
| Spherical Aberration               | kSphAbb                       | 0             | <p>Defines the spherical aberration in the physical lens, which affects the bloom shape differently depending on the amount of aberration in the lens.</p> <p>Negative <b>Spherical Aberration</b> values make the kernels brighter in the center and positive values make the kernels brighter on the edges.</p> |
| Chromatic Aberration               | kChrAbb                       | 0             | Defines the chromatic aberration in the physical lens, which affects the bloom color differently depending on the amount of aberration in the lens.                                                                                                                                                               |
| Chromatic Aberration Offset        | kChrAbbOff                    | 0.6, 1, 1     | Controls the chromatic refraction offset for the red, green, and blue channels. You can also use the color picker or color wheel to select an overall offset color.                                                                                                                                               |
| Chromatic Aberration Matte Channel | N/A                           | off           | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                     |
|                                    | chromicAberrationMatteChannel | none          | The channel to use as a mask. By default, the chromatic aberration effect                                                                                                                                                                                                                                         |

| Control (UI)                           | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                            |               | is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Kernel Tab                             |                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Kernel Type                            | kernelType                 | Circular      | <p>Controls the shape of the bloom kernel to apply to the image:</p> <ul style="list-style-type: none"> <li>• <b>Input</b> - a custom shape defined by the nodes attached to the <b>Kernel</b> input.</li> <li>• <b>Circular</b> - a clean, round lens shape that produces a round bloom effect.</li> <li>• <b>Aperture Blades</b> - a geometric lens shape bloom produced by the aperture blades of the physical lens. The number of blades on the lens is set by the <b>Blades Count</b> control.</li> </ul> <div>  <b>Tip:</b> You can preview the shape of the kernel by changing the <b>Output Type</b> to <b>Filter Shape</b> on the <b>Bokeh</b> tab. </div> |
| Maximum Kernel Size                    | max_kernelsize             | 256           | <p>Sets an upper limit on the size of the kernel.</p> <p>You can reduce this size value to decrease processing time, but any defocus result is then clamped.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Expand Bounding Box To Max Kernel Size | expandBBBoxToMaxKernelSize | off           | <p>When enabled, the bounding box is increased to accommodate the kernel size if the kernel extends beyond the bounding box.</p> <p>When disabled, the parts of the kernel</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)           | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                      |
|------------------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                      |               | extending past the bounding box are ignored.                                                                                                                                                  |
| Missing Kernel Channel | N/A                  | off           | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                 |
|                        | missingKernelChannel | none          | <p>The channel to use if an expected kernel channel is missing from the <b>Kernel</b> input.</p> <p>This channel has no effect on the <b>Circular</b> and <b>Aperture Blades</b> presets.</p> |
| Aspect Ratio           | kAspectRatio         | 1             | Determines the aspect ratio of the kernel. If you're defocusing anamorphic images, set the kernel <b>Aspect Ratio</b> accordingly.                                                            |
| Softness               | kSoftness            | 0.1           | Controls the softness of the kernel. A Softness value of 0 produces a very hard edge and a value of 1 produces a very soft edge.                                                              |
| Blade Count            | kNumSides            | 6             | When <b>Kernel Type</b> is set to <b>Aperture Blades</b> , this control sets the number of blades to simulate. You can use any value between 3 and 16 sides for the kernel shape.             |
| Curvature              | kCurvature           | 0.1           | <p>Controls the curvature of the blades in the kernel shape.</p> <p>Lower values produce sharper angles on the kernel shape and higher values smooth the kernel shape.</p>                    |
| Rotation               | kRotation            | 0             | Controls the rotation of the blades in the kernel shape.                                                                                                                                      |



| Control (UI)                | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|-----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Corrective Slices Tab       |                             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Number of Corrective Slices | correctiveSlices            | 10            | <p>Sets the number of slices the depth channel is divided into during defocus calculations, which can help avoid objects at different depths overlapping incorrectly.</p> <p>The depth volume sliced is defined by the <b>Focal Plane</b> and <b>Focus Region Size</b>.</p> <ul style="list-style-type: none"> <li>• <b>1 slice</b> - the image is defocused in one pass, which can result in overlapping.</li> <li>• <b>2 slices</b> - the front and back regions are processed separately so that objects in the foreground are distinct from objects in the background.</li> <li>• <b>3+ slices</b> - divide the depth channel into this number of equal slices and process each one separately.</li> </ul> |
| Override Near/Far           | overrideNearAndFarForSlices | off           | <p>When enabled, you can override the depth slice volume defined by the <b>Focal Plane</b> and <b>Focus Region Size</b> using the <b>Near and Far</b> controls.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Near and Far                | depthSlicesNearAndFar       | 0, 0          | <p>When <b>Override Near/Far</b> is enabled, use these controls to define the depth volume to separate into slices. The number of slices is defined by the <b>Number of Corrective Slices</b> control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

# BumpBoss

BumpBoss produces an emboss effect by overlaying input A over input B, rather than offsetting a single input image like the Emboss node. The BumpBoss properties can be modified by the offset between the **center** and **lightposition** indicators in the Viewer.

See also [Emboss](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The emboss texture to overlay input B.                                                                                                                                                                                                                                                                                                                                         |
|                 | B               | The image sequence to emboss with input A.                                                                                                                                                                                                                                                                                                                                     |
|                 | mask            | <p>An optional image to use as a mask. By default, the filter effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                     |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BumpBoss Tab      |                  |               |                                                                                                                                                                                                              |
| channels          | channels         | all           | <p>The emboss effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| light position xy | lightposition    | 480, 360      | Sets the coordinates of the <b>lightposition</b> indicator in the Viewer. The position of this indicator in relation to the <b>center</b> indicator controls the shadow applied to                           |

| Control (UI)             | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                  |               | <p>the emboss.</p> <div>  <b>Note:</b> You can also move the <b>lightposition</b> indicator manually. </div>                                                                                                                                                                               |
| Bump Size                | bumpsize         | 1             | Sets the size of the emboss applied to the image connected to input <b>B</b> .                                                                                                                                                                                                                                                                                              |
| Light Height             | height           | 1             | <p>Controls the height of the <b>lightposition</b> indicator, where zero is level with the image, producing no emboss.</p> <p><b>Note:</b> Negative values position the light 'behind' the image.</p>                                                                                                                                                                       |
| Light Intensity          | intensity        | 1             | Sets the intensity of the simulated light.                                                                                                                                                                                                                                                                                                                                  |
| Minimum Shadow Intensity | minshadow        | 0             | Sets the minimum shadow intensity limit. Increasing this value decreases the amount of shadow allowed, and vice versa.                                                                                                                                                                                                                                                      |
| Image Center xy          | center           | 320, 240      | <p>Sets the coordinates of the <b>center</b> indicator in the Viewer. The position of the <b>lightposition</b> indicator in relation to this indicator controls the shadow applied to the emboss.</p> <div>  <b>Note:</b> You can also move the <b>center</b> indicator manually. </div> |
| mask                     | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                               |
|                          | maskChannelInput | none          | The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                              |
| inject                   | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b>                                                                                                                                                                                                                                                                                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | channel. Injecting the mask allows you to use the same mask further downstream.                                              |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter effect is limited to the non-white areas of the mask.                 |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                          |

# Convolv

Convolv lets you create custom filter effects by supplying your own filter image. This image is used as the convolution matrix. In other words, the new value of a pixel is calculated by centering the filter image on the pixel, examining its neighbors, multiplying each pixel value by the corresponding pixel values in the filter image, and then adding the results together. This allows you to defocus a clip and create lens blur effects in the shape of the filter image, for example.

See also [Blur](#) and [Defocus](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | filter          | The filter image. This image is used as the convolution matrix.<br><br>Note that you don't necessarily need to crop the filter image to a smaller size, as Fast Fourier Transforms are used to speed up |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | convolutions with large filter images.                                                                                                                                                                                                                                                                                                                                         |
|                 | image           | The image sequence to receive the convolution filter effect.                                                                                                                                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the filter effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Convolve Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| channels     | channels         | all           | <p>The filter effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Local GPU    | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> |

| Control (UI)         | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|--------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                    |               |  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Use GPU if available | useGPUIfAvailable  | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.         </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| filter channel       | filter_channel     | rgba.alpha    | <p>The channel to use as the convolution matrix from the <b>filter</b> input.</p> <p>This control is only available if <b>use input channels</b> is disabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| use input channels   | use_input_channels | disabled      | <p>When enabled, Convolve uses the same channels from the <b>filter</b> input as the <b>image</b> input (that is, whatever <b>channels</b> is set to).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| filter bounds        | filter_bounds      | shape         | <p>Sets what to use as the filter bounds:</p> <ul style="list-style-type: none"> <li>• <b>shape</b> - The <b>filter</b> input's bounding box. In this case, Convolve only uses the bounding box area, and the center of the filter is the center of the bounding box. This is the default value, and you may want to use it if your <b>filter</b> input is a roto shape with a small bounding box that doesn't fill the entire format area, for example.</li> </ul>                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>format</b> - The <b>filter</b> input's format. In this case, Convolve uses the entire format area, allowing you to offset the filter image within the format.</li> </ul> |
| normalize    | normalize        | enabled       | When enabled, the <b>filter</b> input is divided by the sum of all the pixels in it before using it. This ensures that the convolution doesn't change the overall brightness.                                        |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                        |
|              | maskChannelInput | none          | <p>The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.</p> <p>For example, you can use a depth channel here to simulate depth-of-field blurring.</p>      |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter effect is limited to the non-white areas of the mask.                                                                                                         |
| fringe       | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                  |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full filter effect at 1.                                                                                                                                           |

# Defocus

Defocuses the image using a disc filter. This allows you to simulate the defocusing effect of a circular lens and create lens blur effects like 'bokeh' (the blooming of highlights when defocused).

To create lens blur effects that aren't circular, use the [Convolve](#) node.

To simply blur an image or a matte, use the [Blur](#) node, which is faster than Defocus.

## Inputs and Controls

| Connection Type | Connection Name | Function                       |
|-----------------|-----------------|--------------------------------|
| Input           | unnamed         | The image sequence to defocus. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Defocus Tab  |                  |               |                                                                                                                                                                                                         |
| channels     | channels         | all           | The defocus effect is only applied to these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| defocus      | defocus          | 1             | Sets the size of the defocus disc used.                                                                                                                                                                 |
| aspect ratio | ratio            | 1             | Adjusts the width of the defocus disc without altering its height.                                                                                                                                      |
| scaling      | scale            | 1             | Scales the defocus disc simultaneously on the x and y axes. You can also split the scaling into separate width and height controls.                                                                     |
| quality      | quality          | 20            | Sets the interpolation used to smooth out the discs. Higher values produce better results, but take longer to render.                                                                                   |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| method       | method           | accelerated   | <p>Sets the mode of operation:</p> <ul style="list-style-type: none"> <li>• <b>accelerated</b> - faster than <b>fullprecision</b> mode, especially for large defocus disks.</li> <li>• <b>fullprecision</b> - delivers perfect defocus at the cost of performance.</li> </ul> <div>  <b>Note:</b> Accelerated mode may generate speckles in horizontal lines due to imprecisions in the computer math. Normally, those speckles are invisible to the eye (<math>\delta &lt; 0.00001</math>), but they can cause artifacts in nodes that use comparison math (that is, if <math>(src.red == 0)</math> ...). You can use <b>fullprecision</b> to avoid this speckling, but there is a significant render time increase. </div> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| fringe       | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# DegrainBlue

This gizmo reduces grain in the blue channel, which often is where most grain occurs.

See also [DegrainSimple](#) and [Denoise](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                       |
|-----------------|-----------------|--------------------------------|
| Input           | unnamed         | The image sequence to degrain. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                        |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------|
| User Tab     |                  |               |                                                                                                                                 |
| Size         | size             | 8             | The amount of grain to remove from the blue channel. Increasing this value removes more grain and decreasing it leaves more in. |

# DegrainSimple

Lets you reduce grain in the red, green, and blue channels respectively, and allows you to mask the effect.

See also [DegrainBlue](#) and [Denoise](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to de grain.                                                                                                                                                                                                                                                                                                                                     |
|                 | mask            | An optional image to use as a mask. By default, the grain reduction is limited to the non-black areas of the mask. At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b> . |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                |
|-------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DegrainSimple Tab |                  |               |                                                                                                                                                                                                                                         |
| channels          | channels         | all           | The channels to de grain. If you set this to something other than <b>all</b> , <b>rgba</b> , or <b>rgb</b> , the <b>R blur</b> , <b>G blur</b> , and <b>B blur</b> sliders below affect the first three channels in the selected layer. |
| R blur            | rVal             | 2             | The amount of grain to remove from the red channel.                                                                                                                                                                                     |
| G blur            | gVal             | 2             | The amount of grain to remove from the green channel.                                                                                                                                                                                   |
| B blur            | bVal             | 5             | The amount of grain to remove from the blue channel, which often is where most grain occurs.                                                                                                                                            |
| mask              | N/A              | disabled      | Enable the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                            |
|                   | maskChannelInput | none          | The channel to use as a mask. By default, the grain reduction is limited to the non-black areas of this channel.                                                                                                                        |
| inject            | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                            |
| invert            | invert_mask      | disabled      | Inverts the use of the mask channel so that the grain                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | reduction is limited to the non-white areas of the mask.                                                                     |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full grain reduction at 1.                                                 |

# Denoise

The Denoise node is an efficient tool for removing noise or grain from your footage. It uses spatial or temporal filtering to remove noise without losing image quality.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Motion          | An optional input for attaching pre-calculated motion vectors, such as those created by VectorGenerator.<br><br>Denoise can generate motion vectors internally, but connecting this input may produce significantly faster results.                                  |
|                 | Noise           | An optional input for attaching a separate noise file. If you're working with complex footage that doesn't have a convenient area for analyzing noise, you can use the <b>Noise</b> input to analyze noise from another image and apply the results to your footage. |
|                 | Source          | The image sequence to denoise.                                                                                                                                                                                                                                       |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Denoise Tab          |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more</p>                                                                                                                                                                                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | information on the GPUs supported by your operating system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Source       | type             | Digital       | Choose <b>Film</b> or <b>Digital</b> according to what type of footage you're working with.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Noise Model  | model            | Modulated     | Choose what type of noise you're dealing with: <ul style="list-style-type: none"> <li>• <b>Constant</b> - try this if you're working on film footage with lots of detail and not too much noise in dark regions, or digital footage with lots of detail and not too much noise in light regions.</li> <li>• <b>Modulated</b> - for most cases, this is a good option.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Lift Blacks  | lift_blacks      | disabled      | When enabled, blacks in the image are lifted toward white. This can be particularly useful if your image contains a lot of sub-blacks, areas of black with a value less than 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Profile      | profile          | Constant      | Choose the denoise profile to use: <ul style="list-style-type: none"> <li>• <b>Constant</b> - let Denoise look at the analysis region and remove the same amount of noise across all intensities. <b>Constant</b> is nearly always a good choice, but if you find that your denoise results are too smooth and adjusting <b>DenoiseAmount</b> and <b>RollOff</b> doesn't help, you should try setting this to <b>Automatic</b>.</li> <li>• <b>Automatic</b> - let Denoise estimate a noise profile automatically based on the entire <b>ProfileFrame</b>. This way, Denoise removes different amounts of noise from the shadow, midtone, and highlight areas of the <b>Source</b> image. When you first switch to automatic profiling, Denoise uses the current frame to calculate the profile. If you'd like to use a different frame, you need to set <b>Profile Frame</b> on the <b>Profile</b> tab to that frame and click the <b>Recalculate Profile</b> button.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>Denoise always bases the noise profile on your <b>Source</b> footage, even if you've attached another clip to the <b>Noise</b> input.</p> <p>You can use the <b>TuneProfile</b> controls to tweak both <b>Constant</b> and <b>Automatic</b> profiles.</p>                                                                                                                                                                                                                                         |
| Output         | output           | Result        | <p>Whether to output the denoised image or the noise that was removed:</p> <ul style="list-style-type: none"> <li>• <b>Result</b> - output the denoised <b>Source</b> image.</li> <li>• <b>Noise</b> - output the noise that was removed from the <b>Source</b> image. Only noise should be visible in this image. If you can see a lot of picture detail, it means the current settings are making Denoise work too hard and remove too much of the image, which leads to a soft result.</li> </ul> |
| Denoise Amount | amount           | 1             | Sets the overall amount of noise to remove. Increase this to remove more noise, or decrease to keep more detail. A value of 0 removes no noise.                                                                                                                                                                                                                                                                                                                                                      |
| Roll Off       | rolloff          | 2             | <p>Sets the smoothness of the denoise thresholding.</p> <p>A value of 1 equals hard thresholding. Any other value produces soft thresholding between the <b>Denoise Amount</b> and the <b>Roll Off</b> multiplied by <b>Denoise Amount</b>.</p>                                                                                                                                                                                                                                                      |
| Smoothness     | smoothness       | 1             | Sets the smoothness of the denoised image. This affects the underlying image rather than the noise detected.                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | In most cases, the default value of 1 works fine. However, you can try using this control if you're not getting the correct smoothness level by adjusting the <b>Denoise Amount</b> .                                                                                                                                                                                                                                                                                                                                                                        |
| Luminance Blend     | lumablend        | 0.7           | <p>Blends the denoised luminance with the image's original luminance, bringing back some of the image detail in the result.</p> <p>You might want to have this set to 1 when you're working on denoising the footage, but for the final result, you'll want to decrease it.</p>                                                                                                                                                                                                                                                                              |
| Preserve Edges      | preserve_edges   | disabled      | When enabled, Denoise attempts to sharpen the image at edges to prevent over-smoothing, though this can emphasize noise in some cases.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Temporal Processing |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Enable              | enable_temporal  | disabled      | <p>When enabled, uses frames either side of the current frame to perform temporal frame blending, which may produce a better denoise result.</p> <div>  <b>Note:</b> The <b>Motion</b> input must be connected to enable <b>Temporal Processing</b>. </div> <p>The number of frames used either side of the current frame is determined by the <b>Temporal Frame Offset</b> control.</p> <p>When disabled, uses only the current frame to produce the denoise result.</p> |
| Frame Blending      | frame_blending   | 0.1           | Sets the variance allowed between regions in blended frames. Higher values attempt to blend more regions, but can lose image detail.                                                                                                                                                                                                                                                                                                                                                                                                                         |



| Control (UI)        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                   |               |  <b>Note:</b> This control is only available when <b>Temporal Processing</b> is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Frames to Blend     | frames            | 1             | Sets the number of frames, on either side of the current frame, used to calculate the denoise effect.<br><br> <b>Note:</b> This control is only available when <b>Temporal Processing</b> is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Noise Analysis      |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Lock Noise Analysis | lockNoiseAnalysis | disabled      | When enabled, no analysis is performed. This is activated by default if you use the <b>Import</b> button to read a noise profile from an external file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Analysis Region     | analysisRegion    | N/A           | Enter the coordinates for the region from which you want to analyze noise.<br><br>You can adjust the following: <ul style="list-style-type: none"> <li>• <b>x</b> - the distance (in pixels) between the left edge of the image and the left side of the analysis box.</li> <li>• <b>y</b> - the distance (in pixels) between the bottom edge of the image and the bottom edge of the analysis box.</li> <li>• <b>r</b> - the distance (in pixels) between the left edge of the image and the right side of the analysis box.</li> <li>• <b>t</b> - the distance (in pixels) between the bottom edge of the image and the top edge of the analysis box.</li> <li>• <b>w</b> - the width of the analysis box. This is only available if you click the <b>wh</b> button.</li> <li>• <b>h</b> - the height of the analysis box. This is only available if you click the <b>wh</b> button.</li> </ul> You can also use the analysis box in the Viewer to |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>position the analysis region. This should be a flat area free from image detail, so no textures, edges, or shadows. The minimum size for the analysis region is 80x80 pixels. If the analysis region is too small, Denoise doesn't analyze the footage or remove any noise.</p> <p>By default, whenever the analysis box is altered, the internal analysis of the noise in that region reoccurs.</p> |
| Analysis Frame | analysisFrame    | 1             | <p>The frame at which to analyze the noise in the analysis region.</p> <p>This field is automatically updated if you scrub to a new frame in the Viewer and reposition the analysis box.</p>                                                                                                                                                                                                            |
| Analyze Noise  | analyze          | N/A           | <p>Click this button to analyze the noise in your footage. This can be useful if you scrub to a new frame, don't move the analysis box, and want to reanalyze the noise from the new frame.</p>                                                                                                                                                                                                         |
| Analysis File  | analysisFile     | N/A           | <p>The name and location of an external analysis file. Click the <b>Export</b> button to save the analysis profile in this file, or <b>Import</b> to read the analysis profile from this file.</p> <p>The analysis file can be any binary file - for example a plain text file (.txt).</p>                                                                                                              |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Import                     | import           | N/A           | Reads an analysis profile from an external analysis file (specified in <b>Analysis File</b> ). This disables any controls that are read from the analysis file. To re-enable them, you can uncheck <b>Lock Noise Analysis</b> .                                                                                                                                                                                                                                                           |
| Export                     | export           | N/A           | Saves an analysis profile to an external analysis file (specified in <b>Analysis File</b> ).<br><br><div>  <b>Note:</b> If you've set <b>Profile</b> to <b>Constant</b>, only the controls that affect the analysis are saved in this file. By contrast, if you've set <b>Profile</b> to <b>Automatic</b>, both the analysis profile and the automatically calculated noise profile are exported. </div> |
| Tune Frequencies           |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Process High Frequencies   | processHigh      | enabled       | Enable this if you want to remove noise from high frequencies (fine detail).                                                                                                                                                                                                                                                                                                                                                                                                              |
| High Gain                  | highAmount       | 1             | Scales the threshold for fine noise removal.<br><br>Increase this value to remove more fine noise, or decrease it to keep more detail and fine noise. A value of 0 means no fine noise is removed, whereas 1 is the estimated threshold.                                                                                                                                                                                                                                                  |
| Process Medium Frequencies | processMedium    | enabled       | Enable this if you want to remove noise from medium frequencies.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Medium Gain                | mediumAmount     | 1             | Scales the threshold for medium noise removal.<br><br>Increase this value to remove more medium noise, or decrease it to keep more detail and medium noise. A value of 0 means no medium noise is removed, whereas 1 is the estimated threshold.                                                                                                                                                                                                                                          |
| Process Low                | processLow       | enabled       | Enable this if you want to remove noise from low                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                        |
|------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequencies                  |                  |               | <p>frequencies (coarse detail).</p> <p>Normally, most of the noise occurs in the high and medium frequencies, so often you can disable the low frequency altogether.</p>                                                                                        |
| Low Gain                     | lowAmount        | 1             | <p>Scales the threshold for low noise removal.</p> <p>Increase this value to remove more low noise, or decrease it to keep more detail and low noise. A value of 0 means no low noise is removed, whereas 1 is the estimated threshold.</p>                     |
| Process Very Low Frequencies | processVeryLow   | disabled      | <p>Enable this if you want to remove noise from very low frequencies (very coarse detail).</p> <p>Normally, most of the noise occurs in the high and medium frequencies, so often you can disable the very low frequency altogether.</p>                        |
| Very Low Gain                | veryLowAmount    | 1             | <p>Scales the threshold for very low noise removal.</p> <p>Increase this value to remove more very low noise, or decrease it to keep more detail and very low noise. A value of 0 means no very low noise is removed, whereas 1 is the estimated threshold.</p> |
| Tune Channels                |                  |               |                                                                                                                                                                                                                                                                 |
| Luminance Gain               | lumaAmount       | 1             | Scales the denoising threshold for the luminance channel. Increase this value to remove more noise, or decrease it to keep more detail and noise.                                                                                                               |
| Chrominance Gain             | chromaAmount     | 5             | Scales the denoising threshold for the chrominance channel. Increase this value to remove more noise, or decrease it to keep more detail and noise.                                                                                                             |
| Profile Tab                  |                  |               |                                                                                                                                                                                                                                                                 |
| curve editor                 | profileCurve     | N/A           | The noise profile curve. The x axis represents image intensity, from dark areas on the left to lighter areas                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>on the right. The y axis represents the relative amount of noise removed.</p> <p>You can adjust the curve manually by dragging the points on the curve to a new location. To add more points to the curve, <b>Ctrl/Cmd+Alt</b>+click on the curve.</p> <p>If you are not happy with your changes, click <b>Reset Profile</b> to reset the curve to its original shape.</p> |
| reset        | N/A              | N/A           | <p>Resets any changes you've made to the noise curve. This does not affect changes made using the <b>Low Gain</b>, <b>Mid Gain</b>, and <b>High Gain</b> controls.</p> <p>This button has the same functionality as the <b>Reset Profile</b> button below.</p>                                                                                                                |
| Tune Profile | tuneProfile      | disabled      | <p>Enable this to tune the noise profile by adjusting <b>Low Gain</b>, <b>Mid Gain</b>, or <b>High Gain</b>. This works in both the <b>Constant</b> and <b>Automatic</b> profiling mode.</p>                                                                                                                                                                                  |
| Low Gain     | lowGain          | 1             | <p>Scales the denoising threshold in the low light areas of the <b>Source</b> image. For example, a value of <b>2</b> multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept.</p> <p>This control is only available when <b>Tune Profile</b> is enabled.</p>                             |
| Mid Gain     | midGain          | 1             | <p>Scales the denoising threshold in the midtone areas of the <b>Source</b> image. For example, a value of <b>2</b> multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept.</p> <p>This control is only available when <b>Tune Profile</b> is enabled.</p>                               |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Gain           | highGain         | 1             | <p>Scales the denoising threshold in the highlight areas of the <b>Source</b> image. For example, a value of <b>2</b> multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept.</p> <p>This control is only available when <b>Tune Profile</b> is enabled.</p> |
| Profile Frame       | profileFrame     | 1             | <p>The frame at which to estimate the noise profile when <b>Profile</b> is set to <b>Automatic</b>.</p> <p>This control is read only. If you want to change the profile frame, you need to scrub to a new frame in the Viewer and click <b>Recalculate Profile</b>.</p>                                                                           |
| Recalculate Profile | reprofile        | N/A           | <p>If you've set <b>Profile</b> to <b>Automatic</b>, Denoise first uses the current frame to calculate the profile. If you'd like to use a different frame, you need to scrub to that frame and click this button.</p>                                                                                                                            |

# DirBlur

This node applies three types of directional blur to the input image: **zoom**, **radial**, and **linear**.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the blur effect.                                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DirBlurWrapper Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| channels           | channels         | all           | The blur effect is only applied to these channels. You should leave this set to <b>all</b> and select the channels you want to blur using <b>BlurLayer</b> .                                                                                                                                                                                                                                                                                                                                                    |
| BlurType           | BlurType         | zoom          | <p>Select the blur type to apply:</p> <ul style="list-style-type: none"> <li>• <b>zoom</b> - smears pixels in all directions from a center point. You can use this to simulate light rays, or to transition between one clip and another.</li> <li>• <b>radial</b> - smears pixels around a center point. You can use this to simulate motion blur on a rotating object.</li> <li>• <b>linear</b> - smears pixels in a given direction. You can use this to simulate motion blur on a moving object.</li> </ul> |
| BlurLayer          | BlurLayer        | rgb           | <p>The blur effect is only applied to these channels. This control works together with the <b>channels</b> control. For a channel to be blurred, it needs to be selected from both the <b>channels</b> and the <b>BlurLayer</b> dropdown menu.</p> <p>You can use the checkboxes on the right to select</p>                                                                                                                                                                                                     |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                  |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | individual channels.                                                                                                                                                                                                                                                                      |
| Holdout Channel  | N/A              | disabled      | <p>Enables the associated holdout channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p> <p>This control only has an effect when <b>BlurType</b> is set to <b>zoom</b>.</p>                                                                 |
|                  | holdout          | none          | <p>Pixels corresponding to non-black pixels in the holdout channel are NOT averaged into the final pixel value.</p> <p>This control only has an effect when <b>BlurType</b> is set to <b>zoom</b>.</p>                                                                                    |
| BlurCenter xy    | BlurCenter       | 320, 240      | <p>Sets the blur origin or center on the xy axes, or drag the <b>BlurCenter</b> handle in the Viewer.</p> <p>When using <b>linear</b> blur, <b>BlurCenter</b> only has an effect if <b>UseTarget</b> is enabled.</p>                                                                      |
| BlurLength       | BlurLength       | 5             | <p>The length (in pixels) of the blur applied.</p> <p>When using <b>zoom</b> blur, negative values reverse the blur direction.</p>                                                                                                                                                        |
| BlurAngle        | BlurAngle        | 45            | Determines the direction of <b>linear</b> blur when <b>UseTarget</b> is disabled.                                                                                                                                                                                                         |
| Linear Target xy | target           | 480, 240      | <p>When using <b>linear</b> blur with <b>UseTarget</b> enabled, a vector is created between this and <b>BlurCenter</b>. This vector then determines the direction of linear blur.</p> <p>You can also adjust <b>Linear Target</b> by dragging the <b>target</b> handle in the Viewer.</p> |
| UseTarget        | UseTarget        | disabled      | When enabled, the direction of <b>linear</b> blur is determined by a vector between <b>BlurCenter</b> and <b>Blur</b>                                                                                                                                                                     |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <b>Target.</b><br>If this is disabled, the direction of <b>linear</b> blur is determined by <b>Blur Angle</b> .                                      |
| Samples      | Samples          | 1             | The number of samples. You can increase this value for smoother blur, but note that it takes much longer to render.                                  |
| PixelAspect  | PixelAspect      | 1             | Pixel aspect ratio. If you're working on non-square pixel or anamorphic footage, you need to set this value correctly to avoid unwanted distortions. |
| Quality      | Quality          | 1             | The scaling factor of the blur. The minimum value is 1 and produces the highest quality.                                                             |
| Pixel Offset | pixeloffset      | 0             | When <b>BlurType</b> is set to <b>zoom</b> , lets you offset pixels along the direction of the blur.                                                 |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                        |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the blur is limited to the non-black areas of this channel.                                                |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the blur is limited to the non-white areas of the mask.                                                  |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                         |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full blur effect at 1.                                                                             |

# DropShadow

This gizmo creates a drop shadow for any input image that has an alpha channel with values greater than 0.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------|
| Input           | input           | The input image from which shadows are cast.                            |
|                 | bg              | The background image to merge over using the specified merge operation. |

| Control (UI)        | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                 |
|---------------------|--------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab            |                          |               |                                                                                                                                                                                          |
| enable drop shadow  | enable_dropshadow_effect | enabled       | When enabled, the drop shadow effect is applied.                                                                                                                                         |
| inherit input color | inherit_input_color      | disabled      | When enabled, the drop shadow uses the input color as the shadow and ignores the <b>color</b> control.<br><br>When disabled, the shadow color is determined by the <b>color</b> control. |
| color               | color                    | 0, 0, 0       | When <b>inherit input color</b> is disabled, controls the color used for the drop shadow effect.                                                                                         |
| opacity             | opacity                  | 0.7           | Controls the opacity of the shadow effect.                                                                                                                                               |
| angle               | dropshadow_angle         | 225           | Controls the direction in which the shadow is cast, where 0/360° is equal to left and 180° is right.                                                                                     |

| Control (UI)  | Knob (Scripting)    | Default Value | Function                                                                                                                                             |
|---------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| distance      | dropshadow_distance | 5             | Determines the distance from the input that the shadow falls, in pixels.                                                                             |
| softness      | softness            | 0             | Controls how much blur/feather is applied to the shadow effect.                                                                                      |
| shrink/expand | size                | 0             | Controls the size of the effect by eroding (negative values) or dilating (positive values) the shadow.                                               |
| input         | operation           | over          | <p>Sets the merge operation used when comping the input over the background.</p> <p>See Nuke's <a href="#">online help</a> for more information.</p> |

# EdgeBlur

Blurs detected edges within the matte specified in the matte channel.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to blur.                                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EdgeBlur Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                  |
| channels       | channels         | all           | <p>The blur effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                       |
| matte input    | N/A              | enabled       | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                    |
|                | control channel  | rgba.alpha    | Sets the channel containing the alpha used to detect the edges.                                                                                                                                                                                                                                                                                                                                  |
| size           | size             | 3             | Sets the size of the blur applied to the detected edges.                                                                                                                                                                                                                                                                                                                                         |
| filter         | filter           | gaussian      | <p>Select the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul> <div>  <b>Note:</b> Box is the fastest to render, whereas Gaussian blur is the smoothest.         </div>                                      |
| quality        | quality          | 15            | <p>Sets the quality of the applied filter. Lower values produce faster renders at the expense of smoothness, and vice-versa.</p> <div>  <b>Note:</b> The image is scaled down so the blur filter is no larger than this number, and then scaled up using linear interpolation after filtering.         </div> |
| crop to format | crop             | enabled       | When enabled, if the bounding box equal to or less than the format, don't enlarge it past the format. This                                                                                                                                                                                                                                                                                       |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | avoids creating oversized images that you don't use.                                                                                         |
| edge mult    | edge_mult        | 2             | Controls the sharpness of the edge blur. Lower values produce sharper edges and vice versa.                                                  |
| tint         | tint             | 1             | Sets the multiplier for the rgb channels in the edge blur.                                                                                   |
| brightness   | brightness       | 1             | Sets the multiplier for all channels in the edge blur.                                                                                       |
| output       | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | output           | none          | Sets the output channel for any blur applied.                                                                                                |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the blur is limited to the non-black areas of this channel.                                        |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the blur is limited to the non-white areas of the mask.                                          |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full blur effect at 1.                                                                     |

# EdgeDetect

A basic edge detection node with options for a blur before the edge detection and an erode after.

## Inputs and Controls

| Connection Type | Connection Name | Function                               |
|-----------------|-----------------|----------------------------------------|
| Input           | unnamed         | The image sequence to detect edges in. |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                        |
|-----------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EdgeDetectWrapper Tab |                  |               |                                                                                                                                                                                                 |
| Edge Detector         | edgedetector     | sobel         | Choose an edge detection method: <ul style="list-style-type: none"> <li>• simple</li> <li>• sobel</li> <li>• prewitt</li> </ul>                                                                 |
| channels              | channels         | all           | The effect is only applied to these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| Threshold             | threshold        | 0             |                                                                                                                                                                                                 |
| output                | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                   |
|                       | output           | none          | Sets the output channel for the edge detect applied.                                                                                                                                            |
| mask                  | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                   |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                             |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | maskedgedetect   | none          | The channel to use as a mask. By default, the blur is limited to the non-black areas of this channel.                                                                                                                                |
| PreBlur/PostErode |                  |               |                                                                                                                                                                                                                                      |
| Erode size        | erodesize        | 0             |                                                                                                                                                                                                                                      |
| Blur size         | blursize         | 0             | Lower numbers make the calculations faster but the result might not be as smooth. The image size is scaled down so that the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering. |
| Blur quality      | blurquality      | 15            | Set the blur quality. The lower the number, the faster the calculation.                                                                                                                                                              |

# EdgeExtend

EdgeExtend allows you to correct unpremultiplied foreground color at the edge of soft mattes by eroding or dilating the sample region, pulling pixels from deeper inside or outside your matte. The algorithm behind the node works independent of the size of the fill regions you are trying to extend. You can also output and edge mask to allow you to work on the edges separate from the rest of the image. A typical use case might be adjusting a matte to account for motion blur.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------|
| Input           | Matte           | Controls which areas of the image are affected using the alpha channel or luminance. |
|                 | Source          | The image sequence to which the effect is applied.                                   |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EdgeExtend Tab       |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>-gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more</p>                                                                                                                                                                                                                                                                                                                             |



| Control (UI)            | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                       |               | information on the GPUs supported by your operating system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Channels                | channels              | rgb           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Matte                   | matte                 | Source Alpha  | <p>Where the foreground matte is taken from to limit the effect when eroding or dilating the edges:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the Source input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the Source input.</li> <li>• <b>Matte Luminance</b> - use the luminance of the Matte input.</li> <li>• <b>Matte Inverted Luminance</b> - use the inverted luminance of the Matte input.</li> <li>• <b>Matte Alpha</b> - use the alpha of the Matte input.</li> <li>• <b>Matte Inverted Alpha</b> - use the inverted alpha of the Matte input.</li> </ul> |
| Source Is Premultiplied | sourceIsPremultiplied | disabled      | <p>When enabled, EdgeExtend assumes that the image connected to the <b>Source</b> input is premultiplied.</p> <p>When disabled, no premultiplication is assumed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Erode                   | erode                 | 0             | Controls the amount of erosion or dilation applied to the Matte area. Negative values dilate the matte and positive values erode the matte.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Detail Amount           | detailAmount          | 1             | Controls how much of the original high frequency detail and noise is recovered after eroding or dilating the matte region.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output       |                  |               |                                                                                                                                                                                      |
| Edge Mask    | edgeMaskChannel  | disabled      | When enabled, output an edge mask to the selected channel. This allows you to work on the mask separately to the rest of the image and then merge the result back into the pipeline. |
| Premultiply  | premultiply      | enabled       | When enabled, EdgeExtend premultiplies the output image.<br><br>When disabled, no premultiplication is applied.                                                                      |

# Emboss

Produces an emboss effect by offsetting the original input using the **Angle** and **Width** controls, rather than overlaying a second input like the BumpBoss node.

See also [BumpBoss](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to emboss.                                                                                                                                                                                                                                                                                                                                                |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                           |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emboss Tab    |                  |               |                                                                                                                                                                                                                                                                                    |
| channels      | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                              |
| Emboss Type   | optype           | traditional   | <p>Sets the type of emboss output you want:</p> <ul style="list-style-type: none"> <li>• <b>traditional</b> - applies the emboss effect to the input image.</li> <li>• <b>effect</b> - outputs the effect only, making it easy for you to composite with other footage.</li> </ul> |
| Angle         | Angle            | 0             | Sets the angle of the emboss effect in degrees.                                                                                                                                                                                                                                    |
| Width         | Width            | 1             | Set the width of the emboss outlines. A low value gives a more subtle, finely detailed result.                                                                                                                                                                                     |
| mask          | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                      |
|               | maskedgedetect   | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                            |
| Edge Detector | edgedetector     | sobel         | <p>Choose an edge detection method:</p> <ul style="list-style-type: none"> <li>• simple</li> <li>• sobel</li> <li>• prewitt</li> </ul>                                                                                                                                             |
| edgechannels  | edgechannels     | rgb           | <p>The edge detection is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                      |
| Threshold     | threshold        | 0             |                                                                                                                                                                                                                                                                                    |
| output        | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the                                                                                                                                                                               |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                               |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                  |               | channel to <b>none</b> .                                                                                                                                                                                                                               |
|                   | output           | none          | Sets the output channel for the edge detect applied.                                                                                                                                                                                                   |
| mask              | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                          |
|                   | maskedgedetect   | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                |
| PreBlur/PostErode |                  |               |                                                                                                                                                                                                                                                        |
| Erode size        | erodesize        | 0             |                                                                                                                                                                                                                                                        |
| Blur size         | blursize         | 0             | Set the blur size. Lower values make the calculations faster but the result might not be as smooth. The image size is scaled down so that the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering. |
| Blur quality      | blurquality      | 15            | Set the blur quality. The lower the number, the faster the calculation.                                                                                                                                                                                |
| mask              | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                          |
|                   | maskedgedetect   | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                |
| inject            | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                           |
| invert            | invert_mask      | disabled      | Inverts the use of the mask channel so that the effect is limited to the non-white areas of the mask.                                                                                                                                                  |
| fringe            | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
|              |                  |               | mask.                                                               |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1. |

# Erode (blur)

Similar to [Erode \(filter\)](#), but smoother, input pixels are filtered relative to the **size** control. Negative values cause brighter areas to expand into darker areas and positive values cause darker areas to expand into lighter areas - particularly useful with mattes. Additionally, you can add blur to the input using the **blur** and **quality** controls.



**Note:** Solid areas of any color other than 0 or 1 change their color as they are treated as the anti-aliased edge. This can be corrected by using a different algorithm, such as the [Erode \(filter\)](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                          |
|-----------------|-----------------|-----------------------------------|
| Input           | unnamed         | The image or matte to erode/blur. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Erode Tab    |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                        |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| size         | size             | -1            | Adjusts the size of pixels within the channel defined by the <b>channels</b> control. Negative values increase the light pixels and vice versa. |
| blur         | blur             | 0             | Blurs the edges of the generated mask.                                                                                                          |
| quality      | quality          | 15            | Quality of the initial blur. Smaller values take less time to process.                                                                          |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                   |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                         |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.    |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                          |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                    |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                        |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                             |

## Erode (fast)

Also known as the Dilate node, Erode (fast) controls the relative amount of dark (negative **size** values) and light (positive **size** values) pixels in the input. This can be used to grow or shrink mattes, for example, an alpha matte's pixels can be given a positive **size** value to cover more area.

Erode (fast) is similar to [Erode \(filter\)](#), but computationally less expensive.

## Inputs and Controls

| Connection Type | Connection Name | Function                     |
|-----------------|-----------------|------------------------------|
| Input           | unnamed         | The image or matte to erode. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dilate Tab   |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| size         | size             | 0             | Adjusts the size of pixels within the channel defined by the <b>channels</b> control. Positive values increase the light pixels and vice versa.                                                       |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                         |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                               |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                          |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                          |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                              |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                   |

# Erode (filter)

Filters input pixels relative to the **size** control, and is particularly useful with mattes. Negative values cause brighter areas to expand into darker areas and positive values cause darker areas to expand into lighter areas. Use the **filter** dropdown to control the erode computation speed (**box**) versus quality (**gaussian**).

Erode (filter) is similar to [Erode \(fast\)](#), but can be computationally more expensive because you can select the filter type to improve the erode quality.

## Inputs and Controls

| Connection Type | Connection Name | Function                     |
|-----------------|-----------------|------------------------------|
| Input           | unnamed         | The image or matte to erode. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FilterErode Tab |                  |               |                                                                                                                                                                                                       |
| channels        | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| size            | size             | 1             | Adjusts the size of pixels within the channel defined by the <b>channels</b> control. Values less than 1 increase the light pixels and vice versa.                                                    |
| filter          | filter           | box           | <p>Select the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul>                                       |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> Box is the fastest to render, whereas Gaussian blur is the smoothest. |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                        |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                              |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                         |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                               |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                         |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                             |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                  |

# Glow

Causes bright areas in an image to appear brighter by adding glow using a blur filter.

## Inputs and Controls

| Connection Type | Connection Name | Function                                      |
|-----------------|-----------------|-----------------------------------------------|
| Input           | unnamed         | The image sequence you want to apply glow to. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Glow Tab      |                  |               |                                                                                                                                                                                         |
| channels      | channels         | rgb           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| tint          | tint             | 1             | Sets the color of the glow effect.                                                                                                                                                      |
| tolerance     | tolerance        | 0             | Sets the low threshold below which no glow is applied.                                                                                                                                  |
| brightness    | brightness       | 1             | Sets the brightness of the glow effect.                                                                                                                                                 |
| saturation    | saturation       | 1             | Sets the color saturation value for any glow effect.                                                                                                                                    |
| Width channel | N/A              | disabled      |                                                                                                                                                                                         |
|               | W                | none          |                                                                                                                                                                                         |
| non linear    | nonlinear        | disabled      |                                                                                                                                                                                         |
| effect only   | effect_only      | disabled      | When enabled, only the effect is passed downstream allowing you to use the effect on other footage.                                                                                     |
| size          | size             | 15            | Adjusts the size of pixels within the channels defined by the <b>channels</b> control. Values less than 15 increase the dark pixels and vice versa.                                     |
| filter        | filter           | gaussian      | <p>Sets the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> </ul>                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <ul style="list-style-type: none"> <li>• quadratic</li> <li>• gaussian</li> </ul> <div>  <b>Note:</b> Box is the fastest to render, whereas Gaussian blur is the smoothest.         </div>                                                                                                               |
| n/a            | quality          | 15            | <p>Sets the quality of blur to apply. The image is scaled down, so that the blur filter is no larger than this number, and then scaled up using linear interpolation after filtering.</p> <div>  <b>Note:</b> Lower quality values process more quickly, but the result is not as smooth.         </div> |
| crop to format | crop             | enabled       | When enabled, if the bounding box is at or inside the format, don't enlarge the effect past the format. This avoids creating oversized images that aren't used.                                                                                                                                                                                                                           |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                             |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                   |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                              |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                    |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                       |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1. |

# GodRays

Averages together many samples of the image between its initial position and the **translate** and **center** indicators in the Viewer to produce lighting and blur effects.

- The **translate** indicator controls the direction of the rays created.
- The **center** indicator controls the center point for **rotate**, **scale**, and **skew** functions to produce motion blur.
- Add color and gamma changes, or use a mask input to control the output.



**Note:** Currently **translate** and **skew** do not correctly merge with other controls, such as **scale** - they must be done individually.

## Inputs and Controls

| Connection Type | Connection Name | Function                                               |
|-----------------|-----------------|--------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply godrays. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Godrays Tab  |                  |               |                                                                                                                                                                                  |
| channels     | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | individual channels.                                                                                                                                                                                                                                      |
| translate xy | translate        | 0,0           | <p>Sets the position of the <b>translate</b> widget in the Viewer which controls the direction of the rays or blur.</p> <p>Straight-line motion blur can be simulated by positioning the translate widget along the direction of motion.</p>              |
| rotate       | rotate           | 0             | <p>Controls the direction of rotational rays or blur in relation to the <b>center</b> widget. Negative values produce clockwise rotation and vice versa.</p> <p>You can also use this in conjunction with the <b>scale</b> control to create spirals.</p> |
| scale        | scale            | 1             | <p>Controls the direction of zoom in relation to the <b>center</b> widget. Values less than one zoom out and vice versa.</p> <p>You can also use this in conjunction with the <b>rotate</b> control to create spirals.</p>                                |
| skew         | skew             | 0             | Controls the direction of skew in relation to the <b>center</b> widget                                                                                                                                                                                    |
| center       | center           | 1024, 778     | Sets the coordinates for the <b>center</b> widget in the Viewer. This is the center for <b>rotation</b> , <b>scale</b> , and <b>skew</b> .                                                                                                                |
| from color   | from_color       | 1             | Sets the color by which the initial image is multiplied.                                                                                                                                                                                                  |
| to color     | to_color         | 1             | Sets the color by which the final image is multiplied.                                                                                                                                                                                                    |
| gamma        | gamma            | 1             | Sets the gamma space in which colors are interpolated.                                                                                                                                                                                                    |
| steps        | steps            | 5             | Sets the number of steps used to create the rays. The more steps you use and the shorter, and therefore smoother, the rays appear.                                                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| max          | max              | disabled      | When enabled, only the brightest result of each image is output rather than the average.                                                     |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                      |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                       |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                          |

# Inpaint

Nuke's Inpaint is a time saving node for removing unwanted elements, such as tracking markers, blemishes, or wires. Inpaint uses surrounding pixels to fill an area marked in the alpha channel of the source image or **Matte** input. The **Stretch** controls bias the inpainting in a defined direction and the **Detail** controls allow for greater control and cloning of high frequency textures from another part of the source image, or even from a different image using the **Detail** input. Inpaint also benefits from GPU acceleration to provide fast results.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------|
| Input           | Detail          | The image sequence from which detail is applied to the inpainted area.               |
|                 | Matte           | Controls which areas of the image are affected using the alpha channel or luminance. |
|                 | Source          | The image sequence to which the effect is applied.                                   |

| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inpaint Tab  |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Local GPU    | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.         </div> |
| Use GPU if   | useGPUIfAvailable | enabled       | When enabled, rendering occurs on the <b>Local GPU</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| available    |                  |               | <p>specified, if available, rather than the CPU.</p> <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                                                                                                                 |
| Channels     | channels         | rgb           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Fill Region  | fillRegion       | Source Alpha  | <p>Sets the Matte channel used to inpaint the <b>Fill Region</b>. Source pixels are sampled from outside this region and extended into the <b>Fill Region</b>.</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the Source input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the Source input.</li> <li>• <b>Matte Luminance</b> - use the luminance of the Matte input.</li> <li>• <b>Matte Inverted Luminance</b> - use the inverted luminance of the Matte input.</li> <li>• <b>Matte Alpha</b> - use the alpha of the Matte input.</li> <li>• <b>Matte Inverted Alpha</b> - use the inverted alpha of the Matte input.</li> </ul> |



| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                        |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Smoothness        | smoothness       | 1             | Controls the smoothness of the inpainted area. Higher values can help to reduce flickering between frames, but at the expense of local detail.                                                                                                                                                  |
| L*a*b* Colorspace | LABColourSpace   | disabled      | When enabled, converts the inpainting to the LAB colorspace, which can improve the result.                                                                                                                                                                                                      |
| Stretch           |                  |               |                                                                                                                                                                                                                                                                                                 |
| Amount            | stretchAmount    | 0             | Sets the amount of stretch applied to the edge pixels in the direction indicated by the <b>Direction</b> control.                                                                                                                                                                               |
| Direction         | stretchDirection | 0             | Sets the direction of stretch in degrees when <b>Amount</b> is set to any value greater than 0. You can use the direction to align linear features in the inpainted area, such as road markings or brick work.                                                                                  |
| Detail            |                  |               |                                                                                                                                                                                                                                                                                                 |
| Source            | detailSource     | Source        | Sets where detail is recovered from, the <b>Source</b> input or the <b>Detail</b> input. This allows you to recover detail from another image entirely, such as a grain sample.                                                                                                                 |
| Amount            | detailAmount     | 0             | Controls the amount of high-frequency detail to add back into the inpainted area, where 0 is none and 1 is all the detail from the detail source. Values greater than 1 multiply the detail.<br><br>An example of detail you might want to recover is grain, which can be erased by inpainting. |
| Translate         | translate        | 0,0           | Controls the xy coordinates from which detail is recovered. If the <b>Detail</b> input is a different format to the <b>Source</b> input, you might not get the results you expect, but you can use the <b>Detail Center</b> to correct the offset of the Viewer widget.                         |
| Rotate            | rotate           | 0             | Sets the rotation of the detail recovered, in degrees, relative to the <b>Detail Center</b> controls. Adjusting the <b>Detail Center</b> changes the relative rotation.                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value                                                                   | Function                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale        | scale            | 1                                                                               | Sets the scale of the detail recovered relative to the <b>Detail Center</b> controls. Adjusting the <b>Detail Center</b> changes the relative scale.                                                                                                                                                         |
| Center       | center           | dependent on input format or compositing environment<br><b>Project Settings</b> | <p>Sets the center of the detail so that changes to the translation, rotation, and scale are relative to the <b>Detail Center</b>.</p> <p>This control defaults to the center of the <b>Source</b> format or the <b>Project Settings &gt; full size format</b> control if no <b>Source</b> is connected.</p> |

# Laplacian

The Laplacian node takes the input image, applies a blur, and then subtracts the original from the blurred input to produce an image useful for edge detection or motion estimation. Apply different smoothing filters to the output to trade off between speed (box) and quality (gaussian).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                  |
|-----------------|-----------------|-----------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply the filter. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                         |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Laplacian Tab |                  |               |                                                                                                                                                                                  |
| channels      | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | individual channels.                                                                                                                                                                                                                                                                                                                            |
| size           | size             | 3             | Adjusts the size of pixels within the channel defined by the <b>channels</b> control. Values less than 3 increase the light pixels and vice versa.                                                                                                                                                                                              |
| filter         | filter           | gaussian      | <p>Sets the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul> <div>  <b>Note:</b> Box is the fastest to render, whereas Gaussian blur is the smoothest. </div> |
| n/a            | quality          | 15            | <p>Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth.</p> <p>The image is scaled down during the calculation, so that the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering.</p>                 |
| crop to format | crop             | enabled       | When enabled, crop the resulting image to the format. If the bounding box is at or inside the format, don't enlarge it past the format. This avoids creating oversized images that you don't need.                                                                                                                                              |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                   |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                         |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | same mask further downstream.                                                                                                |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                       |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                          |

# LevelSet

Within a single channel determined by the **channel** control, LevelSet outputs the distance from a pixel in the Viewer to the nearest pixel in the input channel with the value set in the **threshold** control.

LevelSet can be used to make high-quality dilate or unpremultiply operations. When **gradient out** is set to **rgba**, LevelSet outputs the motion vectors of pixels in the Viewer using the **red** (x axis) and **green** (y axis) values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                       |
|-----------------|-----------------|------------------------------------------------|
| Input           | unnamed         | The input sequence to dilate or unpremultiply. |

| Control (UI) | Knob (Scripting) | Default Value | Function |
|--------------|------------------|---------------|----------|
| LevelSet Tab |                  |               |          |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                         |
|----------------------|----------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channel              | channel              | rgba.alpha    | The levelset is only calculated for this channel.                                                                                                                                                                                                                                                                                                |
| threshold            | threshold            | 0.5           | Sets the pixel value that the Viewer pixel distance is measured from.                                                                                                                                                                                                                                                                            |
| level set out        | N/A                  | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                         |
|                      | output               | rgba.alpha    | Write distance from the threshold crossing to this channel.                                                                                                                                                                                                                                                                                      |
| gradient out         | gradient             | motion        | Write gradient vectors to these channels. These vectors point toward the threshold crossing.                                                                                                                                                                                                                                                     |
| create matte         | create_matte         | disabled      | Output a matte channel rather than a level set.                                                                                                                                                                                                                                                                                                  |
| dilate               | matt_limit           | 0             | Output matte is the level set thresholded at this value. This is a good way to grow a matte. Negative values shrink the matte.                                                                                                                                                                                                                   |
| extrapolate channels | extrapolated         | none          | <p>If the <b>creatematte</b> button is turned on and <b>extrapolatechannels</b> is set to something other than <b>none</b>, the colors at the edge of the original matte are extrapolated as the matte is expanded.</p> <p>Unless <b>gradientextrapolate</b> is enabled, this function simply copy uses the color of the closest edge pixel.</p> |
| gradient extrapolate | gradient_extrapolate | disabled      | Instead of copying the nearest pixel, colors are extrapolated as a gradient to produce a ramp.                                                                                                                                                                                                                                                   |

# Matrix

Adds a user defined matrix to the input allowing you to multiply all or specific channels by the matrix values. You can copy and paste an existing matrix, using the Animation menu, or adjust individual fields manually.

The matrix controls how each pixel in the source image is affected by those around it, for example,

```
-1  -1  -1
-1   8  -1
```

$$\begin{matrix} & -1 & -1 & -1 \\ -1 & 8 & -1 & -1 \\ -1 & -1 & -1 & -1 \end{matrix}$$

produces an edge detection filter (see [EdgeDetect](#)) by multiplying the center pixel by 8 and the surrounding pixels by -1, and then adding the nine values together to calculate the new value of the center pixel. This process is repeated for every pixel in the source image to create the output image.



**Note:** Matrix results that fall outside the 0-1 range are clipped.

## Inputs and Controls

| Connection Type | Connection Name | Function                              |
|-----------------|-----------------|---------------------------------------|
| Input           | unnamed         | The image to pass through the matrix. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Matrix Tab   |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| matrix       | matrix           | N/A           | Defines the matrix used to multiply all or specific channels. You can copy and paste an existing matrix, using the Animation menu, or adjust individual fields manually.                              |
| normalize    | normalize        | disabled      | When enabled, the matrix is divided by a constant so that it's sum is 1 (where possible). This causes the output image to have the same brightness as the source image.                               |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                      |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                       |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                 |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                          |

# Median

Input image pixels within the filter area, defined by the **size** control, are sorted into order and the median pixel is output to the Viewer. Median filter are very good at removing single pixel noise, with only a slight loss of sharpness as a side effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                 |
|-----------------|-----------------|------------------------------------------|
| Input           | unnamed         | The image to apply the median filter to. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Median Tab      |                  |               |                                                                                                                                                                                                                                                                                                                           |
| channels        | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                     |
| size            | size             | 3             | Defines the filter area, in pixels, to apply the median across.                                                                                                                                                                                                                                                           |
| ignore top line | ignore_top_line  | disabled      | <p>When enabled, the top line of pixels is ignored within the filter box to account for different area calculation methods.</p> <div>  <b>Note:</b> Enable this control for backward compatibility to pre 6.2v1 versions of Nuke. </div> |
| mask            | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                             |
|                 | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                   |
| inject          | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                              |
| invert          | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                    |
| fringe          | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                       |
| mix             | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                       |



# MotionBlur

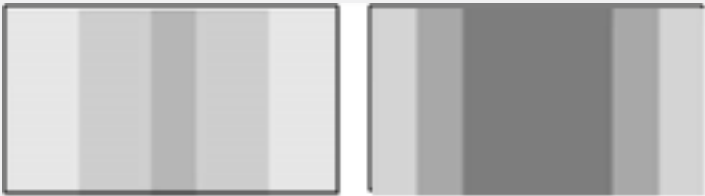
MotionBlur (NukeX and Nuke Studio only) uses the same techniques and technology as the motion blur found in [Kronos](#) to add realistic motion blur to a sequence, but presents the controls in a less complex, more user friendly way.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inputs          | FgVecs          | If the motion in your input sequence has been estimated before (for example, using FurnaceCore's F_VectorGenerator or third-party software), you can supply one or more vector sequences to MotionBlur to save processing time.                                                         |
|                 | BgVecs          |                                                                                                                                                                                                                                                                                         |
|                 | Matte           | If you have separate vectors for the background and foreground, you should connect them to the appropriate inputs and supply the matte that was used to generate them to the <b>Matte</b> input. If you have a single set of vectors, you should connect it to the <b>FgVecs</b> input. |
|                 | Source          | An optional matte of the foreground, which may improve the motion estimation by reducing the dragging of pixels that can occur between foreground and background objects.                                                                                                               |
|                 |                 | The sequence to receive the motion blur effect.                                                                                                                                                                                                                                         |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                       |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| MotionBlur Tab |                  |               |                                                                                                                                |
| Local GPU      | gpuName          | N/A           | Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when: |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                                                        |
| Shutter Samples      | shutterSamples    | 3             | <p>Sets the number of in-between images used to create an output image during the shutter time. Increase this value for smoother motion blur, but note that it takes much longer to render.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                     | <br>Shutter Samples 2      Shutter Samples 20                                                                                                                                                                                                                                                                                                                                                                                               |
| Shutter Time | shutterTime      | 0.75                | <p>Sets the equivalent shutter time of the retimed sequence. For example, a shutter time of 0.5 is equivalent to a 180 degree mechanical shutter, so at 24 frames per second the exposure time will be 1/48th of a second.</p> <p>Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how <b>Shutter Time</b> affects the retimed rectangle.</p> <br>Shutter Time 1      Shutter Time 0.5 |
| Method       | motionEstimation | Dependent on script | <p>Sets the method of calculating motion estimation vectors:</p> <ul style="list-style-type: none"> <li>• <b>Local</b> - uses local block matching to estimate motion vectors. This method is faster to process, but can lead to artifacts in the output.</li> <li>• <b>Regularized</b> - uses semi-global motion estimation to produce more consistent vectors between regions.</li> </ul>                                                                                                                                   |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               |  <b>Note:</b> Scripts loaded from previous versions of Nuke default to <b>Local</b> motion estimation for backward compatibility. Adding a new MotionBlur node to the Node Graph defaults the <b>Method</b> to <b>Regularized</b> motion estimation.                                                                                                                                                                                                                                                                                                                                                                  |
| Vector Detail | vectorDetail     | 0.2           | <p>Varies the density of the vector field. The larger vector detail is, the greater the processing time, but the more detailed the vectors should be.</p> <p>A value of 1 generates a vector at each pixel, whereas a value of 0.5 generates a vector at every other pixel.</p>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Resampling    | resampleType     | Bilinear      | <p>Sets the type of resampling applied when retiming:</p> <ul style="list-style-type: none"> <li>• <b>Bilinear</b> - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use <b>Bilinear</b> to preview a motion blur before using one of the other resampling types to produce your output.</li> <li>• <b>Lanczos4</b> and <b>Lanczos6</b> - these filters are good for scaling down, and provide some image sharpening, but take longer to process.</li> </ul>                                                                                                                                                                                        |
| Matte Channel | matteChannel     | None          | <p>Where to get the (optional) foreground mask to use for motion estimation:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - do not use a matte.</li> <li>• <b>Source Alpha</b> - use the alpha of the <b>Source</b> input.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha of the <b>Source</b> input.</li> <li>• <b>Matte Luminance</b> - use the luminance of the <b>Matte</b> input.</li> <li>• <b>Matte Inverted Luminance</b> - use the inverted luminance of the <b>Matte</b> input.</li> <li>• <b>Matte Alpha</b> - use the alpha of the <b>Matte</b> input.</li> <li>• <b>Matte Inverted Alpha</b> - use the inverted alpha of the <b>Matte</b> input.</li> </ul> |

# MotionBlur2D

MotionBlur2D does not produce motion blur independently. It actually collates UV motion information from the **2D transf** input (for example, a Transform node) to output UV vectors down the node tree to a VectorBlur node, producing motion blur based on these vectors.

[MotionBlur3D](#) does a similar job, but for camera moves instead of 2D transforms.

See also [MotionBlur](#), [Transform](#), [Tracker](#), and [VectorBlur](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                           |
|-----------------|-----------------|--------------------------------------------------------------------|
| Input           | 2D transf       | UV transform information, for example a Transform or Tracker node. |
|                 | unnamed         | The image sequence to receive the motion blur.                     |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                 |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MotionBlur2D Tab |                  |               |                                                                                                                                                                                                                                                                                                                          |
| Output UV        | uv               | motion        | Sets the <b>2D transf</b> input channel(s) from which the motion vector information is derived.                                                                                                                                                                                                                          |
| shutter          | shutter          | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                 |
| shutter offset   | shutteroffset    | start         | Controls how the shutter behaves with respect to the current frame value: <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> </ul> |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | <ul style="list-style-type: none"> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|              | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# MotionBlur3D

While similar to the MotionBlur2D node in that it does not produce motion blur independently, MotionBlur3D is designed specifically for camera moves rather than 2D transforms. MotionBlur3D collates UV motion information from the **cam** input to output UV vectors down the node tree to a VectorBlur node, producing motion blur based on these vectors.

See also [Camera](#) and [VectorBlur](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                              |
|-----------------|-----------------|-------------------------------------------------------|
| Input           | cam             | Connect a camera to provide UV transform information. |
|                 | unnamed         | The image sequence to receive the motion blur.        |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MotionBlur3D Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                              |
| Output UV        | uv               | motion        | Sets the <b>cam</b> input channel(s) from which the motion vector information is derived.                                                                                                                                                                                                                                                                                                                    |
| Z input          | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                     |
|                  | Z                | none          | The channel to use for Z depth information.                                                                                                                                                                                                                                                                                                                                                                  |
| distance         | distance         | 1             | <p>Sets the distance to the object to blur. Higher values cause camera translations to contribute less to motion blur and vice versa. You can set <b>distance</b> to <b>inf</b> to use rotations only.</p> <div>  <b>Note:</b> If a Z input channel is provided, <b>distance</b> is a multiplier for the distance. </div> |
| shutter          | shutter          | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                                                                                                     |
| shutter offset   | shutteroffset    | start         | <p>Controls how the shutter behaves with respect to the current frame value:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1</li> </ul>                                                                                                                                                            |



| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | <p>and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</p> <ul style="list-style-type: none"> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|              | shuttercustomoffset | 0             | <p>If the <b>shutter offset</b> control is set to <b>custom</b>, this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

# Sharpen

Uses Laplacian to sharpen specific channels from the input image. Apply different smoothing filters to the output to trade off between speed (**box**) and quality (**gaussian**).

See also [Soften](#).



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the sharpen effect.                                                                                                                                                                                                                                                                                                                     |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sharpen Tab  |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| minimum      | minimum          | 0             |                                                                                                                                                                                                       |
| maximum      | maximum          | 1             |                                                                                                                                                                                                       |
| amount       | amount           | 1             |                                                                                                                                                                                                       |
| size         | size             | 1             | Adjusts the size of pixels within the channel defined by the <b>channels</b> control. Values less than 3 increase the light pixels and vice versa.                                                    |
| filter       | filter           | gaussian      | <p>Sets the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul>                                         |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               |  <b>Note:</b> Box is the fastest to render, whereas Gaussian blur is the smoothest.                                                                                                                                                            |
| n/a            | quality          | 15            | <p>Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth.</p> <p>The image is scaled down during the calculation, so that the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering.</p> |
| crop to format | crop             | enabled       | When enabled, crop the resulting image to the format. If the bounding box is at or inside the format, don't enlarge it past the format. This avoids creating oversized images that you don't need.                                                                                                                              |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                   |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                         |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                    |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                          |
| fringe         | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                             |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                             |

# Soften

Uses Laplacian to soften specific channels from the input image. Apply different smoothing filters to the output to trade off between speed (box) and quality (gaussian).

See also [Sharpen](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the soften effect.                                                                                                                                                                                                                                                                                                                      |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soften Tab   |                  |               |                                                                                                                                                                                                       |
| channels     | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| minimum      | minimum          | 0             |                                                                                                                                                                                                       |
| maximum      | maximum          | 1             |                                                                                                                                                                                                       |
| amount       | amount           | 1             |                                                                                                                                                                                                       |
| size         | size             | 1             | Adjusts the size of pixels within the channel defined                                                                                                                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | by the <b>channels</b> control. Values less than 3 increase the light pixels and vice versa.                                                                                                                                                                                                                                                    |
| filter         | filter           | gaussian      | <p>Sets the filter algorithm to use:</p> <ul style="list-style-type: none"> <li>• box</li> <li>• triangle</li> <li>• quadratic</li> <li>• gaussian</li> </ul> <div>  <b>Note:</b> Box is the fastest to render, whereas gaussian blur is the smoothest. </div> |
| n/a            | quality          | 15            | <p>Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth.</p> <p>The image is scaled down during the calculation, so that the blur filter is no larger than this number, and then scaled up with linear interpolation after filtering.</p>                 |
| crop to format | crop             | enabled       | When enabled, crop the resulting image to the format. If the bounding box is at or inside the format, don't enlarge it past the format. This avoids creating oversized images that you don't need.                                                                                                                                              |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                   |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                         |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                    |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                          |

# VectorBlur

Generates motion blur by blurring each pixel into a straight line, using the values from the motion vector channels (u and v channels) to determine the direction of the blur. You can create motion vectors using the VectorGenerator, MotionBlur2D, MotionBlur3D, ScanlineRender, or RayRender nodes. Many third-party applications can also produce motion vector information as two-channel, floating point images that you can use with VectorBlur. If possible, you should unpremultiply these images.

You can use the constant **uv offset** values to add motion blur for camera movement and shake. Subtract the xy translation or camera rotation at the current frame from the same values at the next frame to get the correct values to use.

See also [VectorGenerator](#), [MotionBlur2D](#), [MotionBlur3D](#), [ScanlineRender](#), and [RayRender](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to receive the blur effect.                                                                                                                                                                                                                                                                                                                        |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VectorBlur Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| channels       | channels         | none          | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Local GPU      | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> |

| Control (UI)         | Knob (Scripting)  | Default Value        | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|-------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |                      |  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Use GPU if available | useGPUIfAvailable | enabled              | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| uv channels          | uv                | none                 | <p>Sets the channel(s) to control the horizontal (u) and vertical (v) size of the blur vector.</p>  <b>Note:</b> If the <b>uv</b> values are read from a file, enable the Read node's <b>colorspace raw data</b> checkbox. See <a href="#">Read</a> .                                                                                                                                                                                                                                                          |
| mv presets           | mv_presets        | Nuke Scanline Render | <p>Sets which renderer format to apply to the motion vectors. Each preset contains a scale and offset specific to the renderer, so that the vectors are in the format expected by Nuke.</p> <p>For example, if VectorBlur is downstream of a PRMan node, select PRMan from the dropdown.</p>                                                                                                                                                                                                                                                                                                      |
| vector preprocessing |                   |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| output       | output           | result        | <p>Sets the output of the VectorBlur node:</p> <ul style="list-style-type: none"> <li>• <b>result</b> - the final result of the blur is displayed in the Viewer.</li> <li>• <b>uvs</b> - the uv map used to generate the motion vectors.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| blur uv      | blur_uv          | none          | <p>When set to <b>uniform</b> or <b>linear</b>, applies the motion blur filter to the motion vectors themselves, before using them to blur the image.</p> <p>This option can smooth out gradients in the motion vectors, resulting in a softer blur between regions with very different motion.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - don't blur the UVs.</li> <li>• <b>uniform</b> - apply a small uniform blur to soften edges in the UV map. This is how blur was calculated pre-Nuke 10.</li> <li>• <b>linear</b> - apply a linearly-weighted blur to blend between regions with different motion. This has a stronger effect than the <b>uniform</b> option.</li> </ul> |
| invert uv    | invert_uv        | disabled      | <p>When enabled, invert the motion vectors before blurring them.</p> <div>  <p><b>Note:</b> The effect is only visible when the shutter is not centred at the current frame (for Nuke vectors, this means when the shutter offset is not equal to -0.5).</p> </div>                                                                                                                                                                                                                                                                                                                                            |
| uv offset    | uv_offset        | 0             | <p>Sets a constant value to add to the <b>uv channels</b> values.</p> <div>  <p><b>Note:</b> If the <b>uv</b> values are read from a file, this should be -0.5 or -127/255.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                         |



| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                        |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| uv alpha         | N/A              | disabled      | Enables the associated alpha channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                  |
|                  | alpha            | none          | <p>If your motion vectors were premultiplied, set this channel to the channel used to multiply the vectors to improve the results.</p> <div>  <b>Tip:</b> Where possible, use vectors that have not been premultiplied. </div> |
| motion blur      |                  |               |                                                                                                                                                                                                                                                                                                                 |
| blur type        | blur_type        | gaussian      | <p>Sets the profile to use along the direction of blur:</p> <ul style="list-style-type: none"> <li>• <b>uniform</b> - a box-like profile with uniform weighting along the blur vector.</li> <li>• <b>gaussian</b> - a gaussian profile with a softer fall-off towards the ends of the blur vector.</li> </ul>   |
| motion amount    | scale            | 0             | Sets the value by which the u and v channels are multiplied. Set this to 0.5 for motion blur from a standard shutter.                                                                                                                                                                                           |
| motion falloff   | motion_falloff   | 0.33          | Controls the steepness of the gaussian fall-off on the blur. 0 gives a very sharp fall-off, while 1 gives a shallow fall-off.                                                                                                                                                                                   |
| motion offset    | offset           | -0.5          | Sets the shutter offset, causing the shutter to open at <b>frame</b> +/- <b>motion offset</b> .                                                                                                                                                                                                                 |
| expand blur bbox | grow_bbox        | 0             | Sets the number of pixels added to the outside edge of image. Set this manually for cropped images with non-zero uv channels.                                                                                                                                                                                   |
| soft lines       | soft_lines       | disabled      | When enabled, increase the softness of the motion blur by drawing wider lines, at the expense of slower processing.                                                                                                                                                                                             |
| blur inside      | blur_inside      | enabled       | When soft lines is enabled, apply a small blur inside regions with zero motion, to give a                                                                                                                                                                                                                       |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | smoother transition to areas with motion blur.                                                                                                                                                                                                                                                                               |
| normalize    | normalize        | enabled       | <p>When enabled, normalize the results to compensate for tearing (holes appearing behind moving objects) and collisions (objects moving on top of one another) in the rendered output.</p> <p>Normalizing can exacerbate the effects of tearing and collisions, but it tends to give a softer blur than not normalizing.</p> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                |
|              | maskChannelInput | none          | The channel to use as the alpha channel.                                                                                                                                                                                                                                                                                     |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                 |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                       |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                          |

# VolumeRays

The VolumeRays node is actually a gizmo (a group of nodes) designed to create ray lighting effects radiating from the **vol\_pos** indicator in the Viewer.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | img             | The image sequence to receive the VolumeRays effect.                                                                                                                                                                                                                                                                                                                    |
|                 | mask            | <p>An optional image to use as a mask. By default, the effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab            |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Volumetric Creation | style            | RGB Luminance | <p>Sets the style of rays to create, dependent on the available input channels:</p> <ul style="list-style-type: none"> <li>• <b>RGB Luminance</b> - creates rays based on the input image luminance.</li> <li>• <b>Alpha Edges</b> - creates rays based on the input image alpha's edges. This setting has no visible effect on full frame alphas because the rays are created outside the format.</li> <li>• <b>Alpha Solid</b> - creates rays based on the input image's entire alpha.</li> <li>• <b>Shadow Making</b> - creates rays using the input image's alpha to cast shadows.</li> </ul> |
| RGB Options         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Luma Tolerance      | luma_tol         | 0             | Sets the base luminance below which rays are not generated. Increasing this value eliminates rays produced from low luminance areas of the image.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                           |
|--------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alpha Options      |                  |               |                                                                                                                                                                                                                                                                                                                    |
| Edge Size          | edge_size        | 0             | Adjusts the thickness of the alpha's edges, controlling the amount of rays affected by the alpha. Positive values decrease the number of rays allowed past the edges and vice versa.                                                                                                                               |
| Edge Blur          | blur_size        | 3             | Controls the amount of blur applied to rays at the alpha's edges.                                                                                                                                                                                                                                                  |
| Volume Options     |                  |               |                                                                                                                                                                                                                                                                                                                    |
| Volumetrics Center | vol_pos          | 100,100       | Sets the x and y positions for the <b>vol_pos</b> widget in the Viewer.                                                                                                                                                                                                                                            |
| Ray Length         | raylength        | 20            | Sets the length of the generated rays.                                                                                                                                                                                                                                                                             |
| Pre-Ray Blur       | pre_blur         | 0             | Sets the amount of blurring applied to the rays.                                                                                                                                                                                                                                                                   |
| Quality            | quality          | Medium        | Controls the quality of the rays produced: <ul style="list-style-type: none"> <li>• Low</li> <li>• Medium</li> <li>• High</li> <li>• Very High</li> </ul> <div>  <b>Note:</b> Higher quality rays take longer to render. </div> |
| Add on Top         | comp_me          | disabled      | When enabled, the effect overlay and the input image are passed from the node.<br><br>When disabled, only the effect is passed from the node for compositing purposes.                                                                                                                                             |
| Flicker Options    |                  |               |                                                                                                                                                                                                                                                                                                                    |
| Use Flickering     | chk_flicker      | enabled       | When enabled, the <b>Flicker Options</b> are applied to the rays.                                                                                                                                                                                                                                                  |
| Flicker Speed      | flicker_speed    | 2             | Controls the speed of ray flickering. Higher values produce more flicker.                                                                                                                                                                                                                                          |

| Control (UI)                       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                   |
|------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flicker Size                       | flicker_size     | 40            | Controls the size of flicker to generate artificially if the vol_pos widget is static.<br><br><div>  <b>Note:</b> If <b>Transform Noise with Volume Center</b> is enabled, this control has no effect on the rays. </div> |
| Transform Noise with Volume Center | xform_flicker    | disabled      | When enabled, flicker noise moves with the <b>vol_pos</b> widget so that flickering is the result of the <b>FlickerSpeed</b> only.<br><br>When disabled, flicker is artificially generated using the <b>Flicker Size</b> value.                                                                            |
| Color Options                      |                  |               |                                                                                                                                                                                                                                                                                                            |
| Desaturate before Coloring         | chk_desat        | disabled      | When enabled, the input image is fully desaturated so that generated rays do not pickup color from the input.                                                                                                                                                                                              |
| Volume Gamma                       | CCorrect1_gamma  | 1             | Controls the overall amount of Gamma applied to the generated rays.                                                                                                                                                                                                                                        |
| Volume Gain                        | CCorrect1_gain   | 1             | Controls the overall amount of Gain applied to the generated rays.                                                                                                                                                                                                                                         |
| Initial Volume Color               | initcolor        | 1             |                                                                                                                                                                                                                                                                                                            |
| End Volume Color                   | volume_end_color | 0,0,0,0       |                                                                                                                                                                                                                                                                                                            |
| Radial Falloff                     |                  |               |                                                                                                                                                                                                                                                                                                            |
| Enable Radial Falloff              | chk_radial       | enabled       | When enabled, the <b>Radial Falloff</b> controls are applied to the rays.                                                                                                                                                                                                                                  |
| Radial Size                        | radial_size      | 500           |                                                                                                                                                                                                                                                                                                            |
| Radial Falloff                     | rad_softness     | 1             | Controls the amount of falloff as rays move away from the                                                                                                                                                                                                                                                  |

| Control (UI)                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                             |
|-----------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                  |               | <b>vol_pos</b> widget in the Viewer. Higher values cause the rays to fade more rapidly.                                                                                                                                                              |
| Mask Options                      |                  |               |                                                                                                                                                                                                                                                      |
| Enable Mask                       | chk_use_mask     | disabled      | When enabled, any image connected to the <b>Mask</b> input is used as a mask.                                                                                                                                                                        |
|                                   |                  |               | <div>  <b>Note:</b> The mask must contain an alpha channel. </div>                                                                                                  |
| Mask Blur                         | mask_blur        | 0             | Adjusts the blur applied to the edges of the mask.                                                                                                                                                                                                   |
| Transform Mask with Volume Center | chk_xform_mask   | disabled      | <p>When enabled, the mask and <b>vol_pos</b> widget's relative positions are maintained - any transform applied to the <b>vol_pos</b> widget is applied to the mask.</p> <p>When disabled, the mask is not transformed by <b>vol_pos</b> widget.</p> |

# ZDefocus

Blurs the image according to a depth map channel. This allows you to simulate depth-of-field (DOF) blurring.

In order to defocus the image, ZDefocus splits the image up into layers, each of which is assigned the same depth value everywhere and processed with a single blur size. After ZDefocus has processed all the layers, it blends them together from the back to the front of the image, with each new layer going over the top of the previous ones. This allows it to preserve the ordering of objects in the image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | filter          | <p>This image is used as the blur kernel. It represents the shape and size of the camera aperture used to shoot the input footage. As the clip in the <b>image</b> input is blurred, any out-of-focus highlights ('bokeh') in the clip assume the shape of the <b>filter</b> image.</p> <p>You can create a filter image using the Roto node (<b>Draw &gt; Roto</b>) or the Flare node (<b>Draw &gt; Flare</b>), for example. The filter image can also be a color image. For example, if you want to add color fringing to your out-of-focus highlights to simulate chromatic aberration, you can use the Flare node to easily create a suitable filter image.</p> <p>You don't necessarily need to crop the filter image to a smaller size, as Fast Fourier Transforms are used to speed up convolutions with large filter images.</p> |
|                 | image           | The image sequence to receive the blur effect. This should also contain the depth map channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                 | mask            | <p>An optional image to use as a mask. By default, the blur is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ZDefocus Tab |                  |               |                                                                                                                                                                                  |
| channels     | channels         | all           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select</p> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | individual channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                                                                                                                                                                                               |
| depth                | z_channel         | depth.Z       | Specifies the input channel containing the depth map                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channel      |                  |               | <p>information.</p> <div>  <b>Note:</b> The depth map should not be anti-aliased. If it is, pixels along an edge between two objects can be assigned a depth that is in-between the depth of the front and back objects. This looks wrong, as it suggests that those edge pixels are floating somewhere between the objects. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| math         | math             | depth         | <p>Specifies how the <b>depthchannel</b> is used to calculate the distance between the camera and an object. For example, some programs use higher values to denote further away, while in others they mean closer to the camera:</p> <ul style="list-style-type: none"> <li>• <b>direct</b> - The <b>Z</b> value in the <b>depth channel</b> directly controls blur. For example, if <b>Z</b> is 0.5, then the blur size will be 0.5 times the value of the <b>size</b> control (unless this is bigger than <b>maximum</b>, in which case it will be clamped to <b>maximum</b>).</li> <li>• <b>depth</b> - The <b>Z</b> value in the <b>depth channel</b> is the distance between the camera and whatever is in the image at that pixel.</li> <li>• <b>far = 0</b> - The <b>Z</b> value in the <b>depth channel</b> is equal to 1/distance. The values are expected to decrease from large positive values close to the camera to zero at infinity. This is compatible with depth maps generated by Nuke and RenderMan.</li> <li>• <b>far = 1</b> - Near plane = 0, far plane = 1. This is compatible with depth maps generated by OpenGL.</li> <li>• <b>-direct</b> - As with the <b>direct</b> mode, the <b>Z</b> value in the <b>depth channel</b> directly controls blur. In other words, each layer is blurred by the same amount as in the <b>direct</b> mode. However, in this mode, the layers are</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>interpreted as being in the opposite order, so a higher depth value places a layer in front of another rather than behind it.</p> <ul style="list-style-type: none"> <li>• <b>-depth</b> - The <b>Z</b> value in the <b>depth channel</b> is - distance in front of the camera. This is the same as <b>depth</b>, but the distances are negative to start with.</li> <li>• <b>far = -0</b> - The <b>Z</b> value in the <b>depth channel</b> is equal to -1/distance. The values are expected to increase from large negative values close to the camera to zero at infinity. This is compatible with depth maps generated by Maya.</li> <li>• <b>far = -1</b> - Near plane = 0, far plane = -1.</li> </ul>                                    |
| output       | output           | result        | <p>Sets the output type:</p> <ul style="list-style-type: none"> <li>• <b>result</b> - displays the input image and the result of the blur controls.</li> <li>• <b>focal plane setup</b> - displays depth-of-field (DOF) information in the <b>rgb</b> channels: <ul style="list-style-type: none"> <li>• <b>red</b> - Less than DOF (in front of the area that's in focus).</li> <li>• <b>green</b> - Inside DOF (in focus). Note that if <b>depth of field</b> is set to <b>0</b>, nothing is displayed in green.</li> <li>• <b>blue</b> - Greater than DOF (behind the area that's in focus).</li> </ul> </li> <li>• <b>layer setup</b> - like focal plane setup, but displays depth-of-field (DOF) information after the depth has</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>been divided into layers. Pixels assigned to the same layer have the same amount of blur applied to them.</p> <ul style="list-style-type: none"> <li>• <b>filter shape setup</b> - displays the filter shape in <b>rbg</b>, allowing you to adjust the filter more accurately.</li> </ul>                                                                                                                                                                                                                                                                                                                                          |
| show image      | show_image       | enabled       | When <b>output</b> is set to <b>focal plane setup</b> , enabling this shows the depth-of-field (DOF) information overlaid upon the input image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| fill foreground | fill_foreground  | enabled       | <p>When enabled, Nuke attempts to compensate for missing information by filling regions in the foreground which are revealed when the foreground goes out of focus.</p> <p>You can try enabling this control if you see sharp edge artefacts in blurred objects in front of the focal point (nearer to the camera). However, because the true image information isn't available in these regions, enabling <b>fill foreground</b> can sometimes introduce undesirable artefacts by adding things which aren't there. If you see blurry artefacts in the foreground, rather than sharp edge artefacts, try disabling this control.</p> |
| focus plane (C) | center           | 0             | Sets the Z depth of areas in the image that are entirely in focus.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| focal point xy  | focal_point      | 200, 200      | Controls the position of the <b>focal point</b> widget in the Viewer. Adjusting the Viewer widget updates the <b>focusplane</b> and <b>focalpoint</b> fields automatically.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| depth of field          | dof              | 0             | <p>Sets a depth slice around the focus plane that is entirely in focus.</p> <div>  <b>Note:</b> True theoretical depth of field would set this to zero. </div>                                                                                                                                                                                                           |
| blur inside             | blur_dof         | enabled       | <p>When enabled, a small amount of blur is applied to the in-focus region. This gives a smoother transition between the in-focus region and the out-of-focus regions around it.</p>                                                                                                                                                                                                                                                                       |
| size                    | size             | 25            | <p>Sets the size of the blur at infinite depth. Blur nearer the camera than the focus plane may be larger.</p> <p>If you have set <b>math</b> to <b>direct</b>, the size is multiplied by the depth to give the blur size at that depth. Setting <b>size</b> to 1 allows you to use the values in the depth map as the blur size directly.</p>                                                                                                            |
| maximum                 | max_size         | 50            | <p>The filter size is clipped at this maximum value. No blurring greater than this value is generated no matter where the object is in relation to the camera.</p> <p>Set this value as low as possible for maximum processing speed.</p>                                                                                                                                                                                                                 |
| automatic layer spacing | autoLayerSpacing | enabled       | <p>When enabled, ZDefocus automatically works out how many depth layers to use, based on the maximum blur size (<b>maximum</b>). In this mode, the layers are closer together near to the focal plane, where a small change in the blur amount is more obvious, and increasingly more widely-spaced further away.</p> <p>When disabled, you can control the depth layers and their spacing manually using <b>depth layers</b> and <b>layer curve</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| depth layers | nLayers          | 20            | <p>The number of depth layers to use for the blur. Use a small number of layers for maximum speed.</p> <p>The maximum number of blur sizes that are used between 0 and <b>maximum</b> is 256. This means you can have up to 256 layers behind the focal plane, and up to 256 in front of it as well.</p>                                                                                 |
| layer curve  | layerCurve       | 1             | <p>The curve to apply to the layer spacing.</p> <p>A value of 0 gives evenly spaced layers. Positive values concentrate the layers closer to the in-focus region. Negative values mean the layers are concentrated far from the focal plane, towards the <b>maximum</b> blur size.</p>                                                                                                   |
| filter type  | filter_type      | disc          | <p>Sets the blur filter applied to the image:</p> <ul style="list-style-type: none"> <li>• <b>disc</b> - applies a round disc filter to the image.</li> <li>• <b>bladed</b> - applies a bladed filter to the image (simulates the iris blades that can make up a camera's diaphragm).</li> <li>• <b>image</b> - uses the image in the <b>filter</b> input as the blur kernel.</li> </ul> |

The following controls, up to and including **aspect ratio**, are only available when **filter type** is set to **disc**.

|              |        |   |                                                                                                                                                                                                                                                                                        |
|--------------|--------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filter shape | shape  | 0 | Dissolves the filter shape between Gaussian at 0 and disc at 1.                                                                                                                                                                                                                        |
| aspect ratio | aspect | 1 | <p>Sets the filter aspect ratio, which is 1:1 by default. Values less than 1 squeeze the filter on the x axis, and values larger than 1 squeeze it on the y axis.</p> <p>This allows you to simulate the cat's eye effect, caused by vignetting inherent within some lens designs.</p> |

The following controls, up to and including **catadioptric**, are only available when **filter type** is set to **bladed**.

|              |        |   |                                                                                                                 |
|--------------|--------|---|-----------------------------------------------------------------------------------------------------------------|
| aspect ratio | aspect | 1 | Sets the filter aspect ratio, which is 1:1 by default. Values less than 1 squeeze the filter on the x axis, and |
|--------------|--------|---|-----------------------------------------------------------------------------------------------------------------|

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | <p>values larger than 1 squeeze it on the y axis.</p> <p>This allows you to simulate the cat's eye effect, caused by vignetting inherent within some lens designs.</p>                                                                                                                                                             |
| blades            | blades            | 5             | <p>Sets the number of iris blades that make up the camera's diaphragm. A value of 3 produces a triangle, 4 a square, 5 a pentagon, 6 a hexagon, and so on.</p> <div>  <b>Note:</b> This field only accepts integers larger than 1.         </div> |
| roundness         | roundness         | 0.2           | Controls the rounding of the filter polygon's sides, where zero is equal to no rounding.                                                                                                                                                                                                                                           |
| rotation          | rotation          | 0             | Controls filter rotation in degrees. Positive values produce counter-clockwise rotation and vice-versa.                                                                                                                                                                                                                            |
| inner size        | inner_size        | 0.8           | Controls the size of the inner polygon, as a percentage of the outer polygon.                                                                                                                                                                                                                                                      |
| inner feather     | inner_feather     | 1             | Adds outward or inward feathering around the inner polygon. With values larger than 0.5, your feather effect is outward and, respectively, if your values are smaller than 0.5, the feather effect is inward. A value of 0.5 produces no feathering.                                                                               |
| inner brightness  | inner_brightness  | 0.8           | Controls the brightness of the inner polygon, where 0 is equal to black and 1 to white.                                                                                                                                                                                                                                            |
| catadioptric size | catadioptric_size | 0.3           | When <b>catadioptric</b> is enabled, controls the size of the catadioptric hole in the filter.                                                                                                                                                                                                                                     |
| catadioptric      | catadioptric      | disabled      | <p>When enabled, ZDefocus simulates catadioptric lenses. This means the defocused areas of the image are annular, producing donut-shaped bokeh.</p> <p>You can use the <b>catadioptric size</b> to control the hole in the center of the filter.</p>                                                                               |

| Control (UI)                                                                                                                                | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The following controls, up to and including <b>clamp image filter</b> , are only available when <b>filter type</b> is set to <b>image</b> . |                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| legacy resize mode                                                                                                                          | legacy_resize_mode | N/A           | <p>Loading scripts from pre-Nuke 8.0v7 enables the <b>legacy resize mode</b> checkbox automatically, for backward compatibility, and uses the <b>filter bounds</b> dropdown to determine how images used in filtering are resized.</p> <p>Adding new ZDefocus nodes hides the <b>legacy resize mode</b> checkbox and allows you to use the <b>image filter</b> dropdown to give you more flexibility when calculating blur.</p>                                                                                                                                                                                                                                                           |
| filter channel                                                                                                                              | filter_channel     | rgba.alpha    | <p>The channel to use as the convolution matrix from the <b>filter</b> input.</p> <p>This control is only available if <b>use input channels</b> is disabled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| use input channels                                                                                                                          | use_input_channels | disabled      | When enabled, the same channels are used for both the filter and image inputs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| filter bounds                                                                                                                               | filter_bounds      | shape         | <p>Sets what to use as the filter bounds when <b>legacy resize mode</b> is enabled:</p> <ul style="list-style-type: none"> <li>• <b>shape</b> - The <b>filter</b> input's bounding box. In this case, ZDefocus only uses the bounding box area, and the center of the filter is the center of the bounding box. This is the default value, and you may want to use it if your <b>filter</b> input is a roto shape with a small bounding box that doesn't fill the entire format area, for example.</li> <li>• <b>format</b> - The <b>filter</b> input's format. In this case, ZDefocus uses the entire format area, allowing you to offset the filter image within the format.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> This control is only available when <b>legacy resize mode</b> is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| image filter | image_filter     | Cubic         | <p>Sets which of Nuke's filtering algorithms to use when remapping pixels from their original positions to new positions, when <b>legacy resize mode</b> is disabled:</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most</li> </ul> |



| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               |  <b>Note:</b> This control is only available when <b>legacy resize mode</b> is disabled.                                                                                                                                                                                                  |
| clamp image filter | clamp_image_filter | disabled      | <p>When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b>, you may see a haloing effect. If necessary, check <b>clamp image filter</b> to correct this problem.</p>  <b>Note:</b> This control is only available when <b>legacy resize mode</b> is disabled. |
| gamma correction   | bloom_gamma        | disabled      | <p>When enabled, a gamma curve of 2.2 is applied before blurring and then reversed for the final output.</p> <p>This is useful for making bokeh lens shape effects warmer and more visible.</p>                                                                                                                                                                            |
| bloom              | bloom              | disabled      | When enabled, highlights over the <b>bloom threshold</b> are boosted to make lens shape effects more visible.                                                                                                                                                                                                                                                              |
| bloom threshold    | bloom_threshold    | 0.8           | When <b>bloom</b> is enabled, highlights above this value are multiplied by the <b>bloom gain</b> value to make lens shape effects more visible.                                                                                                                                                                                                                           |
| bloom gain         | bloom_gain         | 2             | When <b>bloom</b> is enabled, highlights above the bloom threshold are multiplied by this value.                                                                                                                                                                                                                                                                           |
| mask               | N/A                | disabled      | Enable the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                               |
|                    | maskChannelInput   | none          | The channel to use as a mask. By default, the blur is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                      |
| inject             | inject             | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the blur is limited to the non-white areas of the mask.                         |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                          |
|              |                  |               |                                                                                                                              |

# ZSlice

This node uses the depth channel of the input to highlight a slice of the image characterized by the same Z depth. You can modify the slice using the **Center of Slice** and **Field Width** controls.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The input to select the Z slice from.<br><br><div> <b>Note:</b> The input must contain a Z depth channel.</div>                                                                                                                                                               |
|                 | mask            | An optional image to use as a mask. By default, the slice is limited to the non-black areas of the mask.<br><br>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b> . |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                           |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ZSlice Tab      |                  |               |                                                                                                                                                                                                    |
| channels        | channels         | all           | <p>The effect is only applied these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| Z               | N/A              | disabled      | Enables the associated Z channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                         |
|                 | Zchan            | none          | The channel containing the Z depth information.                                                                                                                                                    |
| Center of Slice | center           | 0.5           | Defines the center, or depth, of the slice within the image. High values are closer to the camera, and lower values further away.                                                                  |
| Field Width     | dof              | 0.1           | Defines the width of the slice. Higher values highlight a thicker slice around the specified depth, and vice versa.                                                                                |
| mask            | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                      |
|                 | maskChannelInput | none          | The channel to use as a mask. By default, the slice is limited to the non-black areas of this channel.                                                                                             |
| inject          | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                       |
| invert          | invert_mask      | disabled      | Inverts the use of the mask channel, so that the slice is limited to the non-white areas of the mask.                                                                                              |
| fringe          | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1. |

# Keyer Nodes

Keyer nodes deal with extracting procedural mattes from image sequences using luma keying, chroma keying, and difference keying.

## ChromaKeyer

ChromaKeyer is a green and bluescreen keyer that can take advantage of the local GPU. Use the **screen color** selector to choose a color from the **Source** input to use as the blue/green screen color. To remove blue/green spill from the foreground object, use the **despill bias** control to pick skin tones from the source. Use the **matte** parameters to improve the matte.

### Inputs and Controls

| Connection Type | Connection Name | Function                     |
|-----------------|-----------------|------------------------------|
| Input           | Source          | The foreground image to key. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ChromaKeyer Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Local GPU       | gpuName          | N/A           | Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when: <ul style="list-style-type: none"><li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li><li>• no suitable GPU was found on your system.</li><li>• it was not possible to create a context for processing on the selected GPU, such as when there</li></ul> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p>is not enough free memory available on the GPU.</p> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div>                                                                                                                                                                             |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| view                 | _view             | final result  | <p>Select what you want to render into the output.</p> <ul style="list-style-type: none"> <li>• <b>intermediate result</b> - view the intermediate result. Use this option on shots that can only be keyed using several different keys on different parts of the image (multipass keying). This renders the original source image with the matte generated in this node. In ChromaKeyer nodes down the tree, you should set the <b>inside mask</b> control to <b>source alpha</b>.</li> <li>• <b>final result</b> - this creates a premultiplied RGBA</li> </ul>                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | foreground that can be composited later. You can produce unmultiplied output by disabling the <b>premultiply</b> control.                                                                                                                                                                                                                                |
| screen color   | _screenColor     | 0, 0, 0       | <p>Sets the screen color to become transparent, usually blue or green background.</p> <p>Click the color swatch next to <b>screen color</b> to activate the eye dropper and then <b>Ctrl/Cmd+Shift</b>+click and drag a rectangular area over the green pixels in the Viewer. This averages the pixels in the area selected to produce a better key.</p> |
| screen gain    | _screenGain      | 1             | Adjusts how much of the screen color is removed to make the screen matte. Increasing this value keys more.                                                                                                                                                                                                                                               |
| screen balance | _screenBalance   | 0.5           | Sets the balance point for the image to key. If the key is not working too well with the default setting, try setting the balance to about 0.05, 0.5 and 0.95 and see what works best.                                                                                                                                                                   |
| matte          |                  |               |                                                                                                                                                                                                                                                                                                                                                          |
| chroma gain    | _chromaGain      | 0             | <p>Controls how much of the chroma difference between the source image and the screen color is used to correct the matte.</p> <p>Increasing <b>chroma gain</b> generates a matte that has less transparent areas in the foreground, but can produce harder edges.</p>                                                                                    |
| white point    | _whitePoint      | 1             | Sets the error threshold used for correcting the foreground. All alpha values above this point are set to 1.                                                                                                                                                                                                                                             |
| black point    | _blackPoint      | 0             | Sets the error threshold used for correcting the background. All alpha values below this point are set to 0.                                                                                                                                                                                                                                             |

| Control (UI)            | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| alpha bias              | _alphaBias           | 0.5, 0.5, 0.5 | Adjusts the <b>alpha bias</b> in case your screen color isn't purely blue or green and is causing parts of the foreground image to become transparent. Pick the color from the part of the foreground that is affected.                                                                                                                                                                                                                                                                                    |
| inside mask             | _insideMask          | ignore        | <p>If you're using multiple ChromaKeyer nodes to pull several different keys on different parts of the image (multipass keying), set <b>inside mask</b> to <b>source alpha</b> to add up the results of previous ChromaKeyer nodes.</p> <p>When set to <b>ignore</b>, any upstream keys are not taken into account.</p>                                                                                                                                                                                    |
| despill                 |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Use custom despill bias | _overrideDespillBias | disabled      | Enables the use of the <b>despill bias</b> control.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| despill bias            | despillBias          | 0.5, 0.5, 0.5 | <p>Adjusts the <b>despill bias</b> to remove any remaining spill from around the foreground image. The most useful colors to pick for <b>despill bias</b> are often hair colors and skin tones.</p> <div>  <b>Note:</b> This control is disabled unless <b>Use custom despill bias</b> is enabled. </div>                                                                                                               |
| replace mode            | _replace             | ignore        | <p>Sets the color method to use for pixels where the alpha of the matte has been modified:</p> <ul style="list-style-type: none"> <li>• <b>ignore</b> - the despilled image is left untouched if the alpha is modified.</li> <li>• <b>edge hard color</b> - the despilled image has a corresponding amount of the <b>replace color</b> added for any increase in alpha.</li> <li>• <b>edge linear color</b> - the image has a corresponding amount of the original pixel (screen color and all)</li> </ul> |



| Control (UI)     | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                   |               | <p>reintroduced/removed if the alpha is changed.</p> <ul style="list-style-type: none"> <li>• <b>edge soft color</b> - the despilled image has a corresponding amount of the <b>replace color</b> added for any increase in alpha, however, it attempts to modulate the luminance of the resulting pixel so that it matches the original pixel. This produces a more subtle result than the <b>edge hard color</b> option.</li> </ul> |
| add-in matte fix | _replaceAlphaDiff | disabled      | When enabled, add the <b>replace color</b> into areas corrected using the matte <b>black point</b> and <b>white point</b> controls to enhance the despill effect.                                                                                                                                                                                                                                                                     |
| replace color    | _replaceColor     | 1, 1, 1       | When <b>replace mode</b> is set to <b>edge hard color</b> or <b>edge soft color</b> , sets the color to add where the alpha of the matte has been increased by the mask.                                                                                                                                                                                                                                                              |
| replace amount   | _replaceAmount    | 1             | Controls the amount of <b>replace color</b> to add in the final result.                                                                                                                                                                                                                                                                                                                                                               |
| premultiply      | _preMultiply      | enabled       | <p>When enabled, premultiply the matte generated by ChromaKeyer with the foreground.</p> <p>Premultiplying the matte can remove noise from the background, but it can also be too aggressive in some areas, such as hair.</p>                                                                                                                                                                                                         |

# Cryptomatte

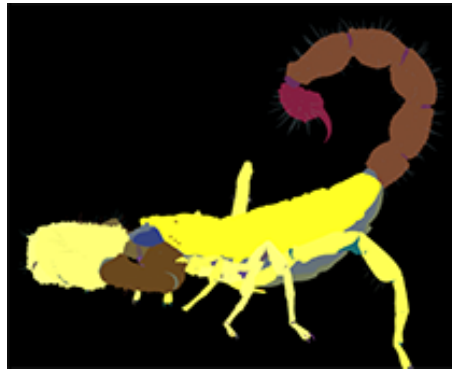
Cryptomatte is a plug-in created by Foundry, based on the Cryptomatte gizmo created at Psyop by Jonah Friedman and Andy Jones. The native version of Cryptomatte is backwards compatible with version 1.2.8 of the gizmo.

You can access the Cryptomatte plug-in from the node toolbar under **Keyer** nodes or by pressing **Tab** in the Node Graph and typing Cryptomatte.

Cryptomatte creates ID mattes in applications such as Maya using organizational information available from a number of renderers including V-Ray and RenderMan. Nuke can then use the Cryptomatte plug-in to isolate individual mattes in the sequence and apply effects to only those areas of the image.



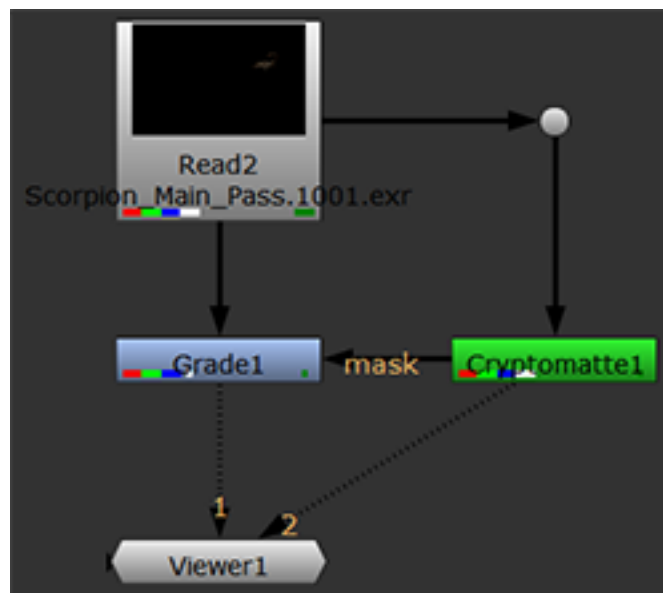
Original image



Selected mattes shown in yellow



Selected mattes used as a mask for grading



Example Node Graph



**Note:** Nuke's native Cryptomatte plug-in is a new version of the original tool, with a re-ordered **Properties** panel and vertical **Matte List** to make selections easily readable. There are three controls, **matteOnly**, **previewMode** and **singleSelection**, that are present in the Gizmo but not available when using the plug-in. For a full list of the Gizmo properties, see the [Pysop Documentation](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                     |
|-----------------|-----------------|--------------------------------------------------------------|
| Input           | unnamed         | The image sequence containing the object or material passes. |

| Control (UI)    | Knob (Scripting)  | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cryptomatte Tab |                   |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Layer Selection | cryptoLayerChoice | Dependent on file | <p>Determines which Cryptomatte layer to use.</p> <p>If your input contains just one Cryptomatte layer then it is selected by default and no other layer options are available in this dropdown.</p> <p>If your input contains multiple Cryptomatte layers, one is selected by default but you can change your layer selection using this dropdown.</p>                                                                                                                                                                                                                                                                                                  |
| Manifest Source | manifestSource    | Metadata          | <p>Determines how the manifest is accessed.</p> <ul style="list-style-type: none"> <li>• <b>Metadata</b> - Choose this option if the manifest is embedded in the input image file's metadata.</li> <li>• <b>Sidecar</b> - Choose this option if the manifest is a separate JSON file. If this option is chosen, use the <b>sidecar</b> field to define the file location.</li> </ul> <p>This control can be used to override the manifest source.</p> <div>  <b>Note:</b> For more information on manifests, see <a href="#">Cryptomatte Metadata</a>.         </div> |
| sidecar         | sidecarFilepath   | N/A               | Type or use the browse button to navigate to the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | manifest JSON file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Preview       | previewEnabled   | Enabled       | <p>Controls whether or not the matte boundaries are drawn in the <b>Viewer</b>.</p> <p>If enabled, the matte boundaries are visible in the Viewer and each separate matte can be seen. If disabled, the original input is displayed. Mattes can still be selected while <b>Preview</b> is enabled.</p> <div>   </div> <div> <div>Enabled</div> <div>Disabled</div> </div> <p>This allows you to quickly switch between your available mattes and input image to help ensure you are making the correct selections.</p> |
| Picker Add    | pickerAdd        | N/A           | <p>Add mattes from the Cryptomatte input to the matte selection. This uses Nuke's eyedropper color picker.</p> <p>Click the color swatch  next to <b>Picker Add</b> and <b>Ctrl/Cmd + Click</b> a matte to add it to the selection.</p> <p>Selected mattes are displayed in yellow in the <b>Viewer</b>. Multiple selections can be added. Once added, matte names are added to the <b>Matte List</b>.</p>                                                                                                                                                                                             |
| Picker Remove | pickerRemove     | N/A           | <p>Remove mattes from the matte selection. This uses Nuke's eyedropper color picker.</p> <p>Click the color swatch  next to <b>Picker Remove</b> and <b>Ctrl + Click</b> a matte to remove it from the selection.</p>                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)    | Knob (Scripting) | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |                     | Once removed, matte names are also removed from the <b>Matte List</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Matte List      | matteList        | N/A                 | <p>A list of currently selected matte names. This list can be modified in text form or using the <b>Picker Add</b> and <b>Picker Remove</b> controls.</p> <p>The <b>Matte List</b> supports basic wildcard functionality so asterisks (*) can be used to select multiple mattes on one line. Asterisks (*) can be appended to a word to represent any number or character.</p> <div>  <b>Note:</b> For more information, see <a href="#">Using the Matte List</a>. </div> |
| Clear           | clearMatteList   | N/A                 | <p>Clears the matte list.</p> <p>All mattes are deselected.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Matte Output    | matteOutput      | Enabled, rgba.alpha | <p>Determines whether the extracted matte is written out to a channel and if so, the channel to which the extracted matte is written.</p> <p>When enabled, the mattes are written to the channel selected from the dropdown.</p> <p>When disabled the matte is not written to a channel, and would have the same result as setting the channel to <b>none</b>.</p>                                                                                                                                                                                         |
| Unpremultiply   | unpremultiply    | Disabled            | When enabled, the matte output is unpremultiplied by the input alpha.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Remove Channels | removeChannels   | Disabled            | When enabled, all channels except rgba and the matte output channel are removed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# Difference

This node produces the difference between two images as a matte. It takes two inputs:

- input **B** contains the subject with the background, and
- input **A** contains the background without the subject (a clean plate).

You can use this node to produce a rough matte for a moving subject shot in front of a static background, for example. However, because of lighting discrepancies, grain, and tiny movements of the camera or background, you may need to use other nodes to refine the results.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | A               | The background without the subject (a clean plate). |
|                 | B               | The subject with the background.                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------|
| Difference Tab |                  |               |                                                                                                                         |
| offset         | offset           | 0             | Subtract this value from each pixel of the output.                                                                      |
| gain           | gain             | 1             | Any pixels that are white are set to this color.                                                                        |
| output         | output           | enabled       | Enables the associated output channel to the right. Disabling this checkbox is the same as setting the channel to none. |
|                |                  | rgba.alpha    | Render the resulting image into this output channel.                                                                    |

## Encryptomatte

Encryptomatte creates new mattes that can be added to an existing set of Cryptomatte-encoded mattes in Nuke.

See [Cryptomatte](#) for more information.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                      |
|-----------------|-----------------|---------------------------------------------------------------|
| Input           | Matte           | The source of the matte to add to the existing set of mattes. |
|                 | unnamed         | The image sequence containing the object or material passes.  |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                     |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Encryptomatte Tab |                  |               |                                                                                                                                                                                                                                                                                                              |
| Matte Name        | matteNameType    | auto          | Sets how the incoming matte is named when added to the existing set of mattes: <ul style="list-style-type: none"> <li>• <b>auto</b> - the name of the matte source node is used. For example, <b>Roto1</b>.</li> <li>• <b>manual</b> - enter the matte name manually using the matteName control.</li> </ul> |
|                   | matteName        |               | When <b>Matte Name</b> is set to manual, enter the name for the new matte here.                                                                                                                                                                                                                              |
| Merge Operation   | mergeOperation   | over          | Sets the compositing mode that controls how the new matte is merged with the existing set. <p>The new matte behaves in the same way as the A input of a standard Merge node and the existing matte set behaves in the same way as the B input.</p>                                                           |
| Cryptomatte Layer | n/a              | none          | Sets the layer to which the new matte is added. You can also select <b>none</b> to have the matte added separately or <b>new</b> to add the matte to new layer.                                                                                                                                              |
| Export            |                  |               |                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------|
| Export Write | exportWrite      | n/a           | Click to add a Write node to the Node Graph with the correct settings to render <b>.exr</b> files containing your mattes. |

# HueKeyer

This node is a chroma keyer. It calculates hue from the incoming red, green, and blue channels, and uses the **amount** curve to determine the value to output in the alpha channel. In the graph, the x axis represents hue and the y axis the alpha value for that hue. To key out a particular hue, find the hue on the x axis and **Ctrl/Cmd+Alt**+click to create a point on the curve at that location. Then drag the point up to a value of 1 on the y axis to set that hue to black in the alpha channel.

## Inputs and Controls

| Connection Type | Connection Name | Function                   |
|-----------------|-----------------|----------------------------|
| Input           | unnamed         | The image sequence to key. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                              |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HueKeyer Tab |                  |               |                                                                                                                                                                                                                       |
| channels     | channels         | rgb           | The hue is calculated from these channels.                                                                                                                                                                            |
| lut          | lut              | N/A           | Use the amount curve to control the amount of alpha that is output from the hue. With the <b>sat_thrsh</b> curve you can adjust the saturation threshold. Increase this threshold to reject hues with low saturation. |
| output       | output           | enabled       | Enables the associated output channel to the right. Disabling this checkbox is the same as setting the channel to none.                                                                                               |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------|
|              |                  | rgba.alpha    | Render the resulting image into this output channel.                |
| invert       | invert           | enabled       | Inverts the use of the alpha channel so that the result is a matte. |

# IBKColor

The IBK keyer differs from many other keyers in that, instead of using a single color picker, it uses an input image (a clean plate with just the color variations of the background) to drive the key. This generally gives you good results when working with uneven blue- or greenscreens.

The IBK keyer consists of two nodes: IBKColor and [IBKGizmo](#). IBKColor creates the clean plate from the blue- or greenscreen image, and IBKGizmo pulls the key.



**Note:** Pre-rendering output from IBKColor to some formats can result in loss of color information and incorrect results when the image is used as input to IBKGizmo. We recommended that the **.exr** format is used for pre-rendered images as it supports full float data, reducing loss of information.

As a general workflow guide:

1. Connect the output from IBKColor to the **c** input of IBKGizmo.
2. Attach the input of IBKColor, along with the **fg** input of IBKGizmo, to the original blue- or greenscreen image.
3. Attach the **bg** input of IBKGizmo to your background image.
4. Create two Viewers and view the output from both nodes side-by-side.
5. Adjust the controls of IBKColor until you get a clean plate with nothing but the background colors.
6. Adjust the controls of IBKGizmo until you are happy with the key.
7. Connect the output from IBKGizmo to a compositing node, such as Merge, to composite the foreground over the background.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | 1               | The blue- or greenscreen image.                     |
| Output          | unnamed         | Connect this to the IBKGizmo node's <b>c</b> input. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameters Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| screen type    | screen_type      | blue          | Select green or blue depending on which one you have in the foreground image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| size           | Size             | 10            | Adjust the amount of color expansion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| darks          | off              | 0, 0, 0       | <p>Adjust the color values to get the best separation between black and the screen type color. You want to be left with shades of the screen color and black only. Start by bringing down the value for blue if you're using a blue screen, and the value for green if you have a green screen in the image. The <b>erode</b> and <b>patchblack</b> sliders should be set to 0 when you're adjusting these values.</p> <p>As a rule of thumb, if you have a dark green discolored area, increase <b>darks g</b>. Similarly, if you have a light red discolored area, increase the <b>lights r</b> value.</p> |
| lights         | mult             | 1, 1, 1       | <p>Adjust the color values to get the best separation between black and the screen type color. You want to be left with shades of the screen color and black only. Start by bringing down the value for blue if you're using a blue screen, and the value for green if you have a green screen in the image. The <b>erode</b> and <b>patchblack</b> sliders should be set to 0 when you're adjusting these values.</p> <p>As a rule of thumb, if you have a dark green discolored area, increase <b>darks g</b>. Similarly, if you have a light red</p>                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | discolored area, increase the <b>lights r</b> value.                                                                                                                                                                                                                                          |
| erode        | erode            | 0             | Increase this value if you still see traces of the foreground edge color in the output. This might be especially useful if, after adjusting the lights and the darks values, you're still left with areas of discoloration. This is likely if your screen does not have a very saturated hue. |
| patch black  | multi            | 0             | After adjusting the darks and the lights, you can increase this value to remove all the black from the output image, if you want. This might be useful, for example, if you get blue/green artifacts in your composite.                                                                       |

# IBKGizmo

The IBK keyer differs from many other keyers in that, instead of using a single color picker, it uses an input image (a clean plate with just the color variations of the background) to drive the key. This generally gives you good results when working with uneven blue- or greenscreens.

The IBK keyer consists of two nodes: [IBKColor](#) and IBKGizmo. IBKColor creates the clean plate from the blue- or greenscreen image, and IBKGizmo pulls the key.



**Note:** The output from IBKGizmo is a premultiplied image with an alpha channel - it does not composite the foreground over the background. To perform the composite, connect IBKGizmo to a compositing node, such as Merge.



**Note:** Pre-rendering output from IBKColor to some formats can result in loss of color information and incorrect results when the image is used as input to IBKGizmo. We recommended that the **.exr** format is used for pre-rendered images as it supports full float data, reducing loss of information.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | bg              | The background image. This is used in calculating fine edge detail.                                                                                                                                                                                                                                                                                                                                                                            |
|                 | c               | Either: <ul style="list-style-type: none"> <li>• An IBKColor node. This creates the clean plate (that is, takes the color that is keyed out and creates a smoother representation of that).</li> <li>• A clean plate that was shot on location. This is more accurate than using an IBKColor node, but in most cases a clean plate isn't available.</li> </ul> If you have set <b>screen type</b> to <b>pick</b> , you do not need this input. |
|                 | fg              | The blue- or greenscreen image.                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IBK Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| screen type  | st               | C-blue        | Set this according to the screen type in your foreground image: <ul style="list-style-type: none"> <li>• <b>C-blue</b> - select this if your foreground image is a bluescreen image and you want to use the <b>c</b> input (a clean plate) to drive the key.</li> <li>• <b>C-green</b> - select this if your foreground image is a greenscreen image and you want to use the <b>c</b> input (a clean plate) to drive the key.</li> <li>• <b>pick</b> - use the color picker below to replace the c input with a single color. This way, the IBK acts more like a traditional keyer, such as <a href="#">Primatte</a>.</li> </ul> |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| color             | color             | 0, 0, 1       | If you've set <b>screen type</b> to <b>pick</b> , use this control to pick a color that best represents the area you are trying to key.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| red weight        | red_weight        | 0.5           | <p>Sets how the red channel is weighted in the keying calculation. This affects the hardness of the matte in primarily red areas.</p> <p>If you check <b>screen subtraction</b> and view the output, you often see discolored edges because the background hasn't been fully removed from the original plate. This is not spill but the result of the matte being too strong. Lowering one of the weights will correct the edge of the foreground object in that color. For example, if a red foreground object has an edge problem, you should lower the <b>red weight</b>. This may affect other edges, so it's often a good idea to use multiple IBKGizmos with different weights split with Keymix nodes (<b>Merge &gt; Keymix</b>).</p> |
| blue/green weight | blue_green_weight | 0.5           | <p>Sets how the blue or green channel is weighted in the keying calculation. This affects the hardness of the matte in primarily blue or green areas.</p> <p>If you're using a bluescreen, this controls the green weight.</p> <p>If you're using a greenscreen, this controls the blue weight.</p> <p>If your foreground and background are opposite extremes in color (for example, yellow on saturated blue), you need to take the weight all the way down, making everything transparent.</p>                                                                                                                                                                                                                                            |
| luminance match   | lm_enable         | disabled      | <p>Adds a luminance factor to the keying and helps to capture transparent foreground areas that are brighter than the background.</p> <p>You can also use <b>luminance match</b> to lessen some of the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>screen area noise if you lower the <b>screen range</b>. However, pushing this control too far will eat into your foreground blacks.</p> <p>You can use this to firm up the alpha channel in the lighter areas.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| screen range    | level            | 1             | <p>Lower this until it stops changing the background. If there's too much noise left in the backing region, you may want to de grain the footage before pulling the key.</p> <p>This may clear the noise from the backing region, but you may also end up hardening the edges of the matte.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| luminance level | luma             | 0             | <p>Allows you to control the strength of the overall effect.</p> <p>This is usually only effective in a small number of cases, generally you don't have to adjust this.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| enable          | ll_enable        | disabled      | Check this to activate the luminance level control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| autolevels      | autolevels       | disabled      | <p>Can be used to reduce any hard edges from a foreground object with saturated colors. The same can be achieved with the <b>weights</b>, but the autolevels control affects only the saturated colors whereas the weights affect the entire image.</p> <p>When using this control, it's best to have this as a separate node that you can then split with other IBKGizmos as the weights controls will no longer work as expected.</p> <p>If you actually have foreground colors you want to keep, you can check the equivalent color box to keep them. For example, you may have a saturated red subject against a bluescreen, which results in a magenta transition area. Autolevels eliminates this. However, if you have a magenta foreground object, autolevels makes the magenta more red. To keep the magenta, you need to check the <b>magenta</b> box.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |               | This control is especially useful for when you have supersaturated colors in your image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| yellow             | yellow           | disabled      | Check this to prevent autolevels from changing saturated yellow in your foreground elements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| cyan               | cyan             | disabled      | Check this to prevent autolevels from changing saturated cyan in your foreground elements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| magenta            | magenta          | disabled      | Check this to prevent autolevels from changing saturated magenta in your foreground elements.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| screen subtraction | ss               | enabled       | <p>To have the keyer subtract the foreground from the RGB, check this control.</p> <p>To premultiply the original foreground with the generated matte, uncheck this control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| use bkg luminance  | ublu             | disabled      | <p>To have the <b>bg</b> input affect the brightness of the edge, check <b>use bkg luminance</b>.</p> <p>These controls are best used with the <b>luminance match enable</b> slider. They can also help with screens that exhibit some form of fringing artifact - usually a darkening or lightening of an edge on one of the color channels on the screen. To offset the effect, grade the bg input up or down with a Grade node (<b>Color &gt; Grade</b>) just before input. If it's just an area that needs help, draw a Bezier shape (Draw &gt; <b>RotoPaint</b>) around the area and grade the bg input up or down locally to remove the artifact.</p> |
| use bkg chroma     | ubcr             | disabled      | <p>To have the <b>bg</b> input affect the color of the edge, check <b>use bkg chroma</b>.</p> <p>These controls are best used with the <b>luminance match enable</b> slider. They can also help with screens that exhibit some form of fringing artifact - usually a darkening or lightening of an edge on one of the color channels on the screen. To offset the effect, grade the bg input up or down with a Grade node (<b>Color &gt; Grade</b>) just before</p>                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                              |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | input. If it's just an area that needs help, draw a Bezier shape ( <b>Draw</b> > <b>RotoPaint</b> ) around the area and grade the bg input up or down locally to remove the artifact. |

# Keyer

This node gives you access to several simple keyers. You can use it to pull keys based on the input image's:

- red, green, or blue channel,
- redscreen, greenscreen, or bluescreen,
- luminance (the default),
- saturation, or
- maximum and minimum values.

To use this node, view the alpha channel in the Viewer. Then, use the **range** graph to adjust the low and high pixel values of the matte. The **A** handle determines the low or transparent values of the key: any pixels that fall below this value are clipped to black. The **B** handle determines your high or opaque values: pixel values above this setting are clipped to white.

The default positions let you control the low and high values, assuming your image has distinct light and dark areas. However, sometimes the subject of the matte falls into the "middle-gray" area; the **C** and **D** handles let you shift the center for the high values of the key.

## Inputs and Controls

| Connection Type | Connection Name | Function                   |
|-----------------|-----------------|----------------------------|
| Input           | unnamed         | The image sequence to key. |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keyer Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| input        | input            | rgb           | Select the layer you want to use for keying.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| output       | N/A              | enabled       | Enables the associated output channel to the right. Disabling this checkbox is the same as setting the channel to none.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|              | output           | rgba.alpha    | Render the resulting image into this output channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| replace      | combine          | replace       | <p>Select how you want to combine the matte with the existing output channels.</p> <ul style="list-style-type: none"> <li>• <b>replace</b> - replace the existing output channels with the matte</li> <li>• <b>intersect</b> - create an intersection of the matte and the existing channels.</li> <li>• <b>union</b> - create a combination of the matte and the existing channels.</li> </ul>                                                                                                                                                                                                                                                                                                                                     |
| invert       | invert           | disabled      | Inverts the use of the alpha channel so that the result is a non-white matte.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| operation    | operation        | luminance key | <p>Select which keying tool you want to use for keying your sequence:</p> <ul style="list-style-type: none"> <li>• <b>red keyer</b> - use the red channel to pull the key.</li> <li>• <b>green keyer</b> - use the green channel to pull the key.</li> <li>• <b>blue keyer</b> - use the blue channel to pull the key.</li> <li>• <b>redscreen</b> - subtract the red channel from other channels.</li> <li>• <b>greenscreen</b> - subtract the green channel from other channels.</li> <li>• <b>bluescreen</b> - subtract the blue channel from other channels.</li> <li>• <b>luminance key</b> - use the luminance value to pull the key.</li> <li>• <b>saturation key</b> - use the saturation value to pull the key.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>max keyer</b> - use the maximum values of the red, green and blue channels to pull the key.</li> <li>• <b>min keyer</b> - use the minimum values of the red, green and blue channels to pull the key.</li> </ul>                                                                          |
| range        | range            | N/A           | Drag the <b>A</b> , <b>B</b> , <b>C</b> , and <b>D</b> delimiter handles in the graph to adjust your keying result. The <b>A</b> delimiter marks the value where you want the keying to start, the distance between <b>B</b> and <b>C</b> mark the length of the full effect and delimiter <b>D</b> indicates where the effect stops. |
| A            | range            | 1             | Enter the value for delimiter <b>A</b> in the <b>range</b> graph. You can also drag the handle in the graph.                                                                                                                                                                                                                          |
| B            | range            | 1             | Enter the value for delimiter <b>B</b> in the <b>range</b> graph. You can also drag the handle in the graph.                                                                                                                                                                                                                          |
| C            | range            | 1             | Enter the value for delimiter <b>C</b> in the <b>range</b> graph. You can also drag the handle in the graph.                                                                                                                                                                                                                          |
| D            | range            | 1             | Enter the value for delimiter <b>D</b> in the <b>range</b> graph. You can also drag the handle in the graph.                                                                                                                                                                                                                          |

# Keylight

Keylight is an industry-proven color difference keyer. Use the **Screen Color** selector to choose a color from the **Source** input to use as the blue/green screen color and the **View** dropdown menu to judge the key. To remove blue/green spill from the foreground object, use the **Despill Bias** control to pick skin tones from the source. Use the **Screen Matte** parameters to improve the matte.

Keylight's core algorithm was developed by the Computer Film Company (now Framestore) and has been further developed by Foundry.

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## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                            |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------|
| Input           | bg              | The background image to replace the blue/green screen in the foreground.                                            |
|                 | OutM            | The Outside Mask, or garbage matte, used to remove unwanted objects (lighting rigs, and so on) from the foreground. |
|                 | InM             | The Inside Mask, or holdout matte, used to confirm areas that are definitely foreground.                            |
|                 | Source          | The foreground image to key.                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keylight Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| View         | show             | Final Result  | <p>Select what you want to render into the output.</p> <ul style="list-style-type: none"> <li>• <b>Source</b> - view the blue/green screen foreground image.</li> <li>• <b>Source Alpha</b> - view the foreground image's alpha channel.</li> <li>• <b>Screen Matte</b> - view the matte created from picking the Screen Color. It does not include any inside or outside masks.</li> <li>• <b>Inside Mask</b> - view the inside input. This is used to firm up the foreground matte to stop print through.</li> <li>• <b>Outside Mask</b> - view the outside input. The outside mask is used as a garbage mask to reveal the background.</li> </ul> |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <ul style="list-style-type: none"> <li>• <b>Combined Matte</b> - view the screen matte, inside mask, and outside masks added together.</li> <li>• <b>Status</b> - view an exaggerated view of the key so that minor problems are shown clearly.</li> <li>• <b>Intermediate Result</b> - view the intermediate result. Use this option on shots that can only be keyed using several different keys on different parts of the image (multipass keying). This renders the original source image with the Screen Matte generated in this Keylight node. In Keylight nodes down the tree, you should set the Source Alpha in the Inside Mask folder to Add To Inside Mask.</li> <li>• <b>Final Result</b> - this creates a premultiplied RGBA foreground that can be composited later. There's an Unpremultiply Result checkbox you can use if you wish.</li> <li>• <b>Composite</b> - this renders the foreground composited over the background using all mattes, spill and color corrections.</li> </ul> |
| Unpremultiply Result | unPreMultiply    | enabled       | When disabled, the key result is not unpremultiplied. If you're using premultiplied images, you should leave this enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Screen Color         | screenColor      | 0, 0, 0       | Sets the screen color to become transparent, usually blue or green background.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Screen Gain          | screenGain       | 1             | Adjusts how much of the screen color is removed to make the screen matte. Increasing this value keys more.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Screen Balance       | screenBalance    | 0.5           | Sets the balance point for the image to key. Generally speaking, blue screens tend to work best with a balance of around 0.95 and green screens with a balance of around 0.5. If the key is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                  |               | not working too well with these settings, try setting the balance to about 0.05, 0.5 and 0.95 and see what works best.                                                                                                                                                                                                                                                               |
| Alpha Bias                 | alphaBias        | 0.5, 0.5, 0.5 | Adjusts the <b>AlphaBias</b> in case your screen color isn't purely blue or green and is causing parts of the foreground image to become transparent. Pick the color from the part of the foreground that is affected.                                                                                                                                                               |
| Despill Bias               | despillBias      | 0.5, 0.5, 0.5 | Adjusts the <b>DespillBias</b> to remove any remaining spill from around the foreground image. The most useful colors to pick for Despill Bias are often hair colors and skin tones.<br><br><div> <b>Note:</b> This control is disabled unless <b>Use Alpha Bias for Despill</b> is disabled.</div> |
| Use Alpha Bias for Despill | gangBiases       | enabled       | When enabled, use the <b>AlphaBias</b> color as the <b>DespillBias</b> color.<br><br>When disabled, set the <b>DespillBias</b> color separately.                                                                                                                                                                                                                                     |
| Screen PreBlur             | preBlur          | 0             | Adjusts how much you want to soften the foreground image used to generate the key. If you're keying digital video or grainy footage, you might get better results if you adjust this control slightly.                                                                                                                                                                               |
| Screen Matte               |                  |               |                                                                                                                                                                                                                                                                                                                                                                                      |
| Clip Black                 | screenClipMin    | 0             | Sets the cut off point below which alpha values in the Screen Matte are set to zero.                                                                                                                                                                                                                                                                                                 |

| Control (UI)        | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|--------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                    |               |  <b>Note:</b> Adjusting this control too aggressively can cause hard edges between the foreground and background.                                                                                                                                                            |
| Clip White          | screenClipMax      | 1             | Sets the cut off point above which alpha values in the Screen Matte are set to the white point.<br><br> <b>Note:</b> Adjusting this control too aggressively can cause hard edges between the foreground and background.                                                     |
| Clip Rollback       | screenClipRollback | 0             | Allows edge detail to be restored after clipping the Screen Matte too aggressively using the <b>ClipBlack</b> and <b>ClipWhite</b> controls.                                                                                                                                                                                                                  |
| Screen Dilate       | screenGrowShrink   | 0             | Adjusts alpha values in the Screen Matte. Either grow (if greater than zero) or shrink (if less than zero) the alpha in the Screen Matte at a sub-pixel level.<br><br> <b>Note:</b> This control should not normally be used as eroding edges can produce a very poor key. |
| Screen Softness     | screenSoftness     | 0             | Controls the amount of blur applied to the matte. For example, softness could be used on a very harsh matte pulled for use as an inside matte further down the tree.                                                                                                                                                                                          |
| Screen Despot Black | screenDespotBlack  | 0             | Removes isolated spots of black in a white matte by simplifying the matte. Black specks in the white matte are absorbed by the surrounding white areas.                                                                                                                                                                                                       |

| Control (UI)         | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Screen Despot White  | screenDespotWhite   | 0             | Removes isolated spots of white in a black matte by simplifying the matte. White specks in the black matte are absorbed by the surrounding black areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Screen Replace       | screenReplaceMethod | Soft Color    | <p>Sets the color method to use for pixels where the alpha of the Screen Matte has been modified:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - the despilled image is left untouched if the alpha is modified.</li> <li>• <b>Source</b> - the image will have a corresponding amount of the original pixel (screen color and all) reintroduced/removed if the alpha is changed.</li> <li>• <b>Hard Color</b> - the despilled image has a corresponding amount of the <b>Screen Replace Color</b> added for any increase in alpha.</li> <li>• <b>Soft Color</b> - the despilled image has a corresponding amount of the <b>Screen Replace Color</b> added for any increase in alpha, however, it attempts to modulate the luminance of the resulting pixel so that it matches the original pixel. This produces a more subtle result than the <b>Hard Color</b> option.</li> </ul> |
| Screen Replace Color | screenReplaceColour | 0.5, 0.5, 0.5 | Sets the color to add where the alpha of the Screen Matte has been increased by the mask when <b>Inside Mask</b> > <b>Inside Replace</b> is set to <b>HardColor</b> or <b>SoftColor</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Tuning               |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Midtones At          | midPoint            | 0.5           | Sets the base midtone level used by the Gain controls below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shadow Gain          | lowGain             | 1             | Adjusts the strength of the shadows in the Screen Matte.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)    | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Midtones Gain   | midGain             | 1             | Adjusts the strength of the midtones in the Screen Matte.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Highlights Gain | highGain            | 1             | Adjusts the strength of the highlights in the Screen Matte.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Inside Mask     |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Source Alpha    | sourceAlphaHandling | Ignore        | <p>This parameter determines what to do with any embedded alpha in the original source image. You will need this if you are doing multiple keys on different parts of the image with the <b>View</b> output set to <b>Intermediate Result</b>:</p> <ul style="list-style-type: none"> <li>• <b>Ignore</b> - this does not add any embedded alpha to the screen matte.</li> <li>• <b>Add To Inside Mask</b> - the embedded alpha is added to the inside mask. You should select this when multipass keying with <b>View</b> set to <b>Intermediate Result</b>.</li> <li>• <b>Normal</b> - the embedded alpha is used to composite the image.</li> </ul>                                                                                            |
| Inside Replace  | insideReplaceMethod | Soft Color    | <p>Sets the color method to use for pixels where the alpha of the Inside Matte has been modified:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - the despilled image is left untouched if the alpha is modified.</li> <li>• <b>Source</b> - the image will have a corresponding amount of the original pixel (screen color and all) reintroduced/removed if the alpha is changed.</li> <li>• <b>Hard Color</b> - the despilled image has a corresponding amount of the <b>Screen Replace Color</b> added for any increase in alpha.</li> <li>• <b>Soft Color</b> - the despilled image has a corresponding amount of the <b>Screen Replace Color</b> added for any increase in alpha, however, it attempts to modulate the</li> </ul> |



| Control (UI)         | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                     |               | luminance of the resulting pixel so that it matches the original pixel. This produces a more subtle result than the <b>Hard Color</b> option.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Inside Replace Color | insideReplaceColour | 0.5, 0.5, 0.5 | Sets the color to add where the alpha of the Inside Matte has been increased by the mask when <b>Inside Mask</b> > <b>Inside Replace</b> is set to <b>HardColor</b> or <b>SoftColor</b> .                                                                                                                                                                                                                                                                                                                                                             |
| Crops                |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| X Method             | SourceXMethod       | Color         | <p>When the crop controls are in use, sets the fill method to use on the X axis at the edges of the clip:</p> <ul style="list-style-type: none"> <li>• <b>Color</b> - uses the <b>Edge Color</b> to fill the cropped area.</li> <li>• <b>Repeat</b> - the edge pixels are used to fill the cropped area.</li> <li>• <b>Reflect</b> - an equal number of pixels are reflected back from the image to fill the cropped area.</li> <li>• <b>Wrap</b> - an equal number of pixels are wrapped from the opposite edge to fill the cropped area.</li> </ul> |
| Y Method             | SourceYMethod       | Color         | <p>When the crop controls are in use, sets the fill method to use on the Y axis at the edges of the clip:</p> <ul style="list-style-type: none"> <li>• <b>Color</b> - uses the <b>Edge Color</b> to fill the cropped area.</li> <li>• <b>Repeat</b> - the edge pixels are used to fill the cropped area.</li> <li>• <b>Reflect</b> - an equal number of pixels are reflected back from the image to fill the cropped area.</li> <li>• <b>Wrap</b> - an equal number of pixels are wrapped</li> </ul>                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | from the opposite edge to fill the cropped area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Edge Color     | SourceEdgeColour | 0             | When an <b>XY Method</b> is set to <b>Color</b> , sets the color used to fill the cropped area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Left           | SourceCropL      | 0             | Sets the crop amount from the left edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Right          | SourceCropR      | 1             | Sets the crop amount from the right edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Bottom         | SourceCropB      | 0             | Sets the crop amount from the bottom edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Top            | SourceCropT      | 1             | Sets the crop amount from the top edge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Keylight       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| InM Component  | insideComponent  | None          | <p>Sets the component to use from any Inside Mask attached to the <b>InM</b> input:</p> <ul style="list-style-type: none"> <li>• <b>Luminance</b> - the luminance of the image connected to the <b>InM</b> input is used.</li> <li>• <b>Inverted Luminance</b> - the luminance of the image connected to the <b>InM</b> input is inverted before use as the mask.</li> <li>• <b>Alpha</b> - the alpha of the image connected to the <b>InM</b> input is used.</li> <li>• <b>Inverted Alpha</b> - the alpha of the image connected to the <b>InM</b> input is inverted before use as the mask.</li> </ul> |
| OutM Component | outsideComponent | None          | <p>Sets the component to use from any Outside Mask attached to the <b>InM</b> input:</p> <ul style="list-style-type: none"> <li>• <b>Luminance</b> - the luminance of the image connected to the <b>OutM</b> input is used.</li> <li>• <b>InvertedLuminance</b> - the luminance of the image connected to the <b>OutM</b> input is</li> </ul>                                                                                                                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | inverted before use as the mask.<br>• <b>Alpha</b> - the alpha of the image connected to the <b>OutM</b> input is used.<br>• <b>InvertedAlpha</b> - the alpha of the image connected to the <b>OutM</b> input is inverted before use as the mask. |
| About        | about            | N/A           | Click to display a Keylight informational box.                                                                                                                                                                                                    |

# Primatte

Primatte keys are created incrementally by sampling single pixels, or a range of pixels, from a blue or greenscreen image. This controls the polyhedron in colorspace that determines what pixels are in or outside the matte. To use Primatte, click **Auto-Compute** to automatically sense the backing screen color, eliminate it, and even get rid of some of the foreground and background noise. Alternatively, you can set **operation** to how you want to use the color samples, or use the left and right arrow buttons to step through all the operations. Then, use **Ctrl**+click or **Ctrl**+**Shift**+drag to select a single color or a range of colors from the Viewer. Primatte then uses these to adjust the polyhedron. Nuke provides unlimited Undo during this process.

Primatte is a trademark of IMAGICA Corp. Primatte patent is held by IMAGICA Corp.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                 |
|-----------------|-----------------|--------------------------------------------------------------------------|
| Input           | bg              | The background image to replace the blue/green screen in the foreground. |
|                 | fg              | The foreground, or subject, image to key.                                |
|                 | mask            | An optional image to use as a mask. By default, the Primatte effect is   |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | <p>limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primatte Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| foreground   | foreground       | rgb           | Channels from the <b>fg</b> input containing the image to key and composite.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| background   | background       | rgb           | Channels from the <b>bg</b> input to composite over, and to calculate the spill suppression.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| crop         | crop             | N/A           | <p>The area of the input image you want to keep. Anything outside this box is cropped.</p> <p>You can adjust the following:</p> <ul style="list-style-type: none"> <li>• <b>x</b> - the distance (in pixels) between the left edge of the original image and the left side of the crop box.</li> <li>• <b>y</b> - the distance (in pixels) between the bottom edge of the original image and the bottom edge of the crop box.</li> <li>• <b>r</b> - the distance (in pixels) between the left edge of the original image and the right side of the crop box.</li> <li>• <b>t</b> - the distance (in pixels) between the bottom edge of the original image and the top edge of the crop box.</li> <li>• <b>w</b> - the width of the crop box. This is only available if you click the <b>wh</b> button.</li> <li>• <b>h</b> - the height of the crop box. This is only available if you click the <b>wh</b> button.</li> </ul> <p>You can also adjust the crop box in the Viewer by</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | dragging its edges.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                |
|              | mask             | none          | The channel to use as a mask. By default, the Primatte effect is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the Primatte effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Initialize   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| algorithm    | algorithm        | Primatte      | <p>Choose which algorithm Primatte uses to calculate your keying result:</p> <ul style="list-style-type: none"> <li>• <b>Primatte</b> - The Primatte algorithm delivers the best results and supports both the solid color and the complement color spill suppression methods. It is the algorithm that uses three multi-faceted polyhedrons (as described further down in the this chapter) to separate the 3D RGB colorspace. It is also the default algorithm mode and, because it is computationally intensive, it may take longer to render.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>PrimatteRT</b> - is the simplest algorithm and therefore, the fastest. It uses only a single planar surface to separate the 3D RGB colorspace (as described further down in this chapter) and, as a result, does not have the ability to separate out the foreground from the backing screen as carefully as the above <b>Primatte</b> algorithm. Other disadvantages of the <b>Primatte RT</b> algorithm is that it does not work well with less saturated backing screen colors and it does not support the complement color spill suppression method.</li> <li>• <b>Primatte RT+</b> - this is in between the above two options. It uses a six planar surface color separation algorithm (as described further down in this document) and delivers results in between the other two in both quality and performance. Other disadvantages of the <b>Primatte RT+</b> algorithm is that it does not work well with less saturated backing screen colors and it does not support the complement color spill suppression method.</li> </ul> |
| Reset        | Reset            | N/A           | Resets all of the Primatte properties to their initial values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Auto-Compute | Auto-Compute     | N/A           | This can be used as the first step in the Primatte operation. Its purpose is to automatically detect the backing screen color, remove it, and do some clean-up on the foreground and background noise. If the clip was shot with an evenly lit, well-saturated backing screen, the <b>Auto-Compute</b> button leaves you with an image that may only need some spill removal to complete your keying operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| viewer       | viewer           | disabled      | Opens a Primatte Viewer that displays a graphical representation of the Primatte algorithms and allows you to see what is happening as the various Primatte tools are used. It is a passive feature that has no                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value         | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                       | adjustment capabilities, but it may prove useful in evaluating an image as you operate on it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Degrain      |                  |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| type         | graintype        | none                  | <p>Select the type of degrain to use:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - you get the color of the exact pixel sampled.</li> <li>• <b>small</b> - gets the average color of a small region of the area around the sampled pixel. Use this when the grain is very dense.</li> <li>• <b>medium</b> - gets the average color of a medium-sized region of the area around the sampled pixel. Use this when the grain is less dense.</li> <li>• <b>large</b> - gets the average color of a larger region of the area around the sampled pixel. Use this when the grain is very loose.</li> </ul> |
| tolerance    | graintolerance   | 0.2                   | <p>Increases the effect of the <b>Clean BG Noise</b> tool without changing the edge of the foreground object. This allows you to tell the Primatte algorithm what brightness of pixels you think represents grain. You should try not to use too high of a value; otherwise, it affects the overall matte.</p>                                                                                                                                                                                                                                                                                                     |
| Actions      |                  |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| operation    | mode             | Smart Select BG Color | <p>What the colors you sample in the Viewer do:</p> <ul style="list-style-type: none"> <li>• <b>Smart Select BG Color</b> - gets the sampled backing screen color, analyzes the original foreground image, and determines the foreground areas using the Primatte foreground detection routine. Then, using the newly determined foreground areas, performs a Clean FG Noise operation internally and renders the composite image.</li> <li>• <b>Clean BG Noise</b> - removes noise from the background. Any pixels you sample in the Viewer are</li> </ul>                                                        |

| Control (UI)             | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                  |               | <p>known to be 100% background. White noisy areas in the 100% background region become black.</p> <ul style="list-style-type: none"> <li>• <b>Clean FG Noise</b> - removes noise from the foreground. Any pixels you sample in the Viewer are known to be 100% foreground. The color of the sampled pixels is registered by Primatte to be the same color as in the original foreground image. This makes dark gray areas in the 100% foreground region white.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| operation<br>(continued) |                  |               | <ul style="list-style-type: none"> <li>• <b>Matte Sponge</b> - sets the sampled color in the image to be 100% foreground. However, if the sampled color is already keyed out and removed, it leaves the current suppressed color. It only affects the key or matte information. This tool is usually used to quickly remove stray transparent pixels that have appeared during the chroma keying procedure.</li> <li>• <b>Make FG Trans.</b> - suppresses spill in foreground transparency. When this mode is selected, the opaque foreground color region sampled in the Viewer becomes slightly translucent. This operation is useful for the subtle tuning of foreground objects that are otherwise completely covered with smoke or clouds.</li> <li>• <b>Restore Detail</b> - brings back detail to the foreground. The completely transparent background region sampled in the Viewer becomes translucent. This operation is useful for restoring lost hair details, thin wisps of smoke and so on.</li> <li>• <b>Spill Sponge</b> - removes spill from a composite image. When this mode is selected, the background color component in the pixels sampled in the Viewer is keyed out and removed for the color region selected.</li> </ul> |
| operation                |                  |               | <ul style="list-style-type: none"> <li>• <b>Spill(-)</b> - removes color spill from the sampled pixel</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (continued)           |                  |               | <p>color (and all colors like it) in the amount of one Primatte increment. If spill color remains, another click using this tool removes more of the color spill.</p> <ul style="list-style-type: none"> <li>• <b>Spill(+)</b> - returns color spill to the sampled pixel color (and all colors like it) in the amount of one Primatte increment. This tool is used to move the sampled color more in the direction of the color in the original foreground image. It can be used to nullify a <b>Spill (-)</b> step.</li> <li>• <b>Matte(-)</b> - reduces the opacity of the matte for the sampled pixel color (and all colors like it) in the amount of one Primatte increment. If the matte is still too opaque, another click using this operational mode tool makes the sampled color region even more translucent. This can be used to thin out smoke or make a shadow thinner to match shadows in the background imagery.</li> <li>• <b>Matte(+)</b> - increases the opacity of the matte for the sampled pixel color (and all colors like it) in the amount of one Primatte increment. If the matte is still too translucent or thin, another click using this operational mode tool makes the sampled color region even more opaque. This can be used to thicken smoke or make a shadow darker to match shadows in the background imagery. It can only make these adjustments to the density of the color region on the original foreground image. It can be used to nullify a <b>Matte (-)</b> step.</li> </ul> |
| operation (continued) |                  |               | <ul style="list-style-type: none"> <li>• <b>Detail(-)</b> - reduces foreground detail for the sampled pixel color (and all colors like it) in the amount of one Primatte increment. If detail is still missing, another click using this operational mode tool makes detail more visible. This can be used to restore lost smoke or wisps of hair.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <ul style="list-style-type: none"> <li>• <b>Detail(+)</b> - increases foreground detail for the sampled pixel color (and all colors like it) in the amount of one Primatte increment. If there is still too much detail, another click using this operational mode tool makes more of it disappear. This can be used to remove smoke or wisps of hair from the composite. Sample where detail is visible and it disappears. This is for moving color regions into the 100% background region. It can be used to nullify a <b>Detail (-)</b> step.</li> <li>• <b>Fine Tuning Sliders</b> - provides finer control over the removal of spilled background color. The color of the sampled pixel is registered as a reference color for fine tuning. To perform the tuning operation, select a Fine Tuning slider and move it to achieve the desired effect.</li> <li>• <b>3D Sample</b> - When viewer is enabled in the Primatte properties, the sampled colors are displayed as a spray of white pixels in the Primatte Viewer. This allows you to see where the selected backing screen colors reside within the 3D RGB colorspace.</li> <li>• <b>Simple Select BG Color</b> - gets the sampled backing screen color, projecting a line in the opposite direction on the hue wheel and generating artificial pixels that may represent the FG object. Then, using the artificially generated foreground pixels, it performs a Clean FG Noise operation internally and renders the composite image.</li> </ul> |
|  | currentColor     | black         | To sample colors from the Viewer, make sure this is pushed in (displaying an eyedropper), then <b>Ctrl/Cmd</b> +click in the Viewer to pick single pixels, or <b>Ctrl/Cmd</b> + <b>Shift</b> +drag to pick a rectangle of pixels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| adjust lighting                                                                     | adjustLighting   | disabled      | When enabled, based on the currently selected BG color, Primatte generates a clean, evenly lit backing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | screen to use in the keying operation. This can improve the results if you have a very unevenly lit backing screen.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| hybrid render   | hybridRender     | disabled      | <p>When enabled, Primatte internally creates two keys from the same image:</p> <ul style="list-style-type: none"> <li>• <b>core</b> - This matte has the transparency removed, but suffers from the bad edges on the foreground object.</li> <li>• <b>edge</b> - This matte has a clean edge on the foreground, but suffers from transparency within the foreground object.</li> </ul> <p>The <b>core</b> matte with the bad edges is then blurred and eroded before it is composited over the <b>edge</b> matte that has the transparency, resulting in a composite with the best of both options.</p> <p>This can help you deal with foregrounds that contain a color that is close to the backing screen color.</p> |
| Adjust Lighting |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| threshold       | lightingSPoly    | 10            | When <b>adjust lighting</b> is enabled, determines if a grid pixel should be treated as a pure background sample, a simulated background sample, or a foreground sample. Increasing the value brings more of the foreground into the adjusted lighting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| grid size       | lightingGridSize | 12            | When <b>adjust lighting</b> is enabled, sets the grid size used. Increasing this value increases the grid resolution used in the adjusted lighting calculation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Hybrid Matte    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| erode           | hybridErode      | 5             | When <b>hybrid render</b> is enabled, sets the amount of erosion performed on the <b>core</b> matte. To view the results, set <b>output mode</b> to <b>hybrid core</b> and view the alpha channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| blur radius     | hybridBlurRadius | 0.5           | When <b>hybrid render</b> is enabled, sets the blur radius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | used when blurring the <b>core</b> matte. To view the results, set <b>output mode</b> to <b>hybrid edge</b> and view the alpha channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Fine Tuning     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| L-poly (spill)  | spill            | 0             | Adjust boundary between spill-suppressed opaque foreground and no-change opaque foreground. The more to the right the slider moves, the more spill is removed. The more to the left the slider moves, the closer the color component of the selected region is to the color in the original foreground image.                                                                                                                                                                                                                                                                                                                               |
| M-poly (trans)  | matte            | 0             | Adjust boundary between partially transparent foreground and fully opaque foreground. Moving this slider to the right makes the registered color region more transparent. Moving the slider to the left makes the matte more opaque.                                                                                                                                                                                                                                                                                                                                                                                                        |
| S-poly (detail) | detail           | 0             | Adjust boundary between completely transparent background and partially translucent foreground. Moving this slider to the right makes the registered color region more visible. Moving the slider to the left makes the color region less visible.                                                                                                                                                                                                                                                                                                                                                                                          |
| Spill Process   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| replace with    | spillProcess     | complement    | <p>The color spill replacement method to use:</p> <ul style="list-style-type: none"> <li>• <b>no suppression</b> - no spill suppression is applied.</li> <li>• <b>complement</b> - replaces the spill color with the complement of the backing screen color.</li> <li>• <b>solid color</b> - replaces the spill color with a solid color of your choice. Use <b>replace color</b> below to choose the color.</li> <li>• <b>defocused background</b> - replaces the spill color with colors from a defocused version of the background image. Use <b>defocus</b> to adjust the amount of defocus applied to the background buffer</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| replace color | replaceColor     | 0.18          | When <b>replace with</b> is set to <b>solid color</b> , allows you to select a solid color to use to replace the spill.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| defocus       | defocus          | 10            | When <b>replace with</b> is set to <b>defocused background</b> , sets the amount to defocus the background for spill process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Output        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| output mode   | output_mode      | composite     | <p>Determines what the output from the node should be:</p> <ul style="list-style-type: none"> <li>• <b>composite</b> - premultiplies the foreground with the background based on the matte created. This is your final result.</li> <li>• <b>premultiplied</b> - outputs the premultiplied result of the Primatte node, along with the calculated matte. This can be useful if you want to do your compositing using a Merge node (with <b>operation</b> set to <b>over</b>) rather than Primatte. This allows you to color correct, transform, and otherwise process your image before compositing it over the background. Note, however, that Primatte works within the sRGB colorspace, whereas Nuke works within a linear colorspace. This means you need to add a Colorspace node after both Primatte and your original background image to convert their colorspace to sRGB, then do your color corrections or transforms, merge the images together, and, finally, use another Colorspace node to convert the result back to linear.</li> </ul> |

| Control (UI)            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                  |               | <ul style="list-style-type: none"> <li>• <b>unpremultiplied</b> - outputs the unpremultiplied result of the Primatte node, along with the calculated matte. This can be useful if you want to do your compositing using a Merge node (with <b>operation</b> set to <b>matte</b>) rather than Primatte. This allows you to color correct, transform, and otherwise process your image before compositing it over the background. Note, however, that Primatte works within the sRGB colorspace, whereas Nuke works within a linear colorspace. This means you need to add a Colorspace node after both Primatte and your original background image to convert their colorspace to sRGB, then do your color corrections or transforms, merge the images together, and, finally, use another Colorspace node to convert the result back to linear.</li> </ul>                                                                           |
| output mode (continued) |                  |               | <ul style="list-style-type: none"> <li>• <b>notpremultiplied</b> - outputs the original foreground pixels (instead of the result of the Primatte node), along with the calculated matte.</li> <li>• <b>adjust lighting FG</b> - outputs the light-adjusted foreground that the adjust lighting mode creates (this has a more even shade of the backing color with the foreground object). If adjust lighting is disabled, this option simply displays the un-optimized, original foreground image.</li> <li>• <b>adjust lighting BG</b> - outputs the optimized artificial backing screen that the adjust lighting mode creates (a clean backing screen that has no foreground object).</li> <li>• <b>hybrid core</b> - outputs the internally generated core matte, used when hybrid render is enabled.</li> <li>• <b>hybrid edge</b> - outputs the internally generated edge matte, used when hybrid render is enabled.</li> </ul> |
| output                  | output           | rgba          | The channels to write the output image to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# Ultimatte

Ultimatte AdvantEdge technology is a color difference keyer. It is the culmination of over 25 years of bluescreen imaging experience by Ultimatte Corporation. The final result is a composite that preserves fine details like hair, smoke, and motion blurred edges with a minimum of compromises.

As a general workflow guide:

1. Use the **screen** control in the Viewer to sample the screen (backing) color near detail that you want to retain.
2. Activate the **overlay** display and use the **overlay +** and **-** pickers to get the overlay to cover as much of the screen as possible without intruding on the foreground subject area. The overlay indicates areas that will definitely not be in the composite.
3. Turn the overlay view off, view the alpha channel, and use the **matte +** and **-** pickers to bring areas more solidly into the matte or remove noise or other aberrations from the matte.
4. Use the **hold shadow** dropper (only available when **screen correct** and **shadow** are enabled) to scrub on the shadows that you'd like to preserve. These shadows may best be seen in the foreground image. This allows the shadows to be handled separately (and more accurately) from foreground subject areas.
5. Finally, you can use the **spill** and **match** pickers to improve the color correction applied to the RGB channels.

Ultimatte is a trademark of Ultimatte Corporation. Ultimatte patent is held by Ultimatte Corporation.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                   |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | hm              | The holdout matte used to confirm areas that are definitely foreground.<br><br>At first, the holdout mask input appears as triangle on the left side of the node, but when you drag it, it turns into an arrow labeled hm. |
|                 | gm              | The garbage matte used to remove unwanted objects (lighting rigs, and so on) from the foreground.                                                                                                                          |

| Connection Type | Connection Name | Function                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------|
|                 | bg              | The background, or screen, image to replace the blue/green screen in the foreground. |
|                 | cp              | An optional clean plate input.                                                       |
|                 | fg              | The foreground, or subject, image to key.                                            |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ultimatte Tab     |                   |               |                                                                                                                                                                                                                                                                                                                            |
| screen color      | screen_color      | 0             | Sets the primary color on which the screen extraction is based. Choose an area on the blue/green screen near important subject detail that is not obscured in any way.                                                                                                                                                     |
| Film              | film              | disabled      | When enabled, the controls on the <b>Film</b> tab are activated.                                                                                                                                                                                                                                                           |
| screen correct    | screen_correct    | enabled       | When enabled, the controls on the <b>Screen Correct</b> tab are activated.                                                                                                                                                                                                                                                 |
| shadow            | shadow            | disabled      | When enabled, the controls on the <b>Shadow</b> tab are activated.                                                                                                                                                                                                                                                         |
| spill suppression | spill_suppression | enabled       | When enabled, the controls on the <b>Spill</b> tab are activated.                                                                                                                                                                                                                                                          |
| cleanup           | cleanup           | disabled      | When enabled, the controls on the <b>Cleanup</b> tab are activated.                                                                                                                                                                                                                                                        |
| color conformance | color_conformance | disabled      | When enabled, the controls on the <b>Color</b> tab are activated.                                                                                                                                                                                                                                                          |
| overlay           | overlay_mode      | off           | Select overlay rendering mode: <ul style="list-style-type: none"> <li>• <b>off</b> - do not display an overlay.</li> <li>• <b>screen</b> - leave the subject unchanged and display the preliminary matte area blended with the overlay color.</li> <li>• <b>subject</b> - view the subject blended with overlay</li> </ul> |



| Control (UI)             | Knob (Scripting) | Default Value               | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                  |                             | <p>color, and leave the preliminary matte area unchanged.</p> <ul style="list-style-type: none"> <li>• Use the add and remove overlay tools to select pixels that should be included in, or excluded from, the screen correct region.</li> <li>• <b>Note:</b> The add and remove overlay tools accumulate scrubbed pixels in keep and remove lists. If the lists contain equivalent values, a conflict may occur, resulting in no visible change to the overlay when picking. To correct this, try using Undo to revert recent selections or the <b>Reset</b> button on the <b>ScreenCorrect</b> tab.</li> </ul> |
| show image as monochrome | overlay_mono     | disabled                    | When <b>overlay</b> is set to <b>screen</b> or <b>subject</b> , enable this control to make the input image grayscale so that the overlay areas are more easily distinguishable.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| overlay color            | overlay_color    | 0.57999998, 0.07, 0.22, 0.5 | When <b>overlay</b> is set to <b>screen</b> or <b>subject</b> , sets the overlay color. Adjust the alpha channel to modify the opacity of the overlay.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| output mode              | output_mode      | Composite                   | <p>Sets the type of output to produce:</p> <ul style="list-style-type: none"> <li>• <b>composite</b> - displays a composite of the screen and subject output.</li> <li>• <b>premultiplied</b> - displays the premultiplied screen and subject.</li> <li>• <b>unpremultiplied</b> - displays the unpremultiplied screen and subject.</li> </ul>                                                                                                                                                                                                                                                                   |
| Density Tab              |                  |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| brights                  | brights          | 100                         | Adjusts the matte density in bright foreground areas. Low values are more transparent, high values are more opaque.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                                                                            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                         |                  |               |  <b>Note:</b> Hard, dark edges may occur around foreground subjects if this control is set too high.                                                                                                                                                                  |
| darks                                                                                   | darks            | 0             | Adjusts the matte density in black glossy or dark foreground objects. Low values are more transparent, high values are more opaque.                                                                                                                                                                                                                    |
| edge kernel                                                                             | edge_kernel      | 0             | Sets the number of pixels to use as a kernel to reduce dark edges that may exist in transition areas due to an over-dense matte.<br><br> <b>Note:</b> Settings this control too high may cause excessive print-through from the background at the edges of the matte. |
| warm                                                                                    | warm             | 0             | Adjusts the matte density in warm colors (like flesh tones). Low values are more transparent, high values are more opaque.<br><br> <b>Note:</b> Print-through may occur in red-hued foreground objects if this control is set too low.                              |
| cool                                                                                    | cool             | 0             | Adjusts the matte density in cool colors. Low values are more transparent, high values are more opaque.<br><br> <b>Note:</b> Print-through may occur in blue-hued foreground objects if this control is set too low.                                                |
| Screen Correct Tab - these controls are primarily for use on green screen imperfections |                  |               |                                                                                                                                                                                                                                                                                                                                                        |
| enable                                                                                  | screen_correct   | enabled       | When enabled, the overlay <b>Screen Correction</b>                                                                                                                                                                                                                                                                                                     |

| Control (UI)        | Knob (Scripting)         | Default Value                      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|--------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                          |                                    | <p>controls are activated.</p> <p>There are a few cases where you can get better results by disabling screen correction:</p> <ul style="list-style-type: none"> <li>• When there is no clear view of the screen. For instance it is entirely covered by smoke, or is shot through a window with lots of reflections.</li> <li>• When you happen to have a combination of noise/grain and screen color that make it impractical or impossible to find settings for the controls that produce a usable result.</li> </ul> <p>The screen correct algorithm generates a synthetic clean plate internally, but for best results, also provide a clean plate as input if you have one.</p> <div>  <b>Note:</b> It is important to pre-crop out any non-image areas, such as letterbox blanking areas, so that they are not interpolated into the screen area. </div> |
| screen tolerance    | screen_tolerance         | 0.50999999, 0.50999999, 0.51999998 | Adjusts the color range, or tolerance, per channel to be included or excluded from the screen overlay.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| shrink              | screen_shrink            | 2                                  | Adjusts the screen overlay. Increasing the <b>shrink</b> value erodes the overlay and decreasing it dilates the overlay.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| darks (red smaller) | screen_darks_red_smaller | 0                                  | Excludes or includes dark areas from the screen overlay. This control only affects areas where the blue value (when using green screen) is greater than the red value in the foreground image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| darks (red larger)  | screen_darks_red_larger  | 0                                  | Excludes or includes dark areas from the screen overlay. This control only affects areas where the red value (when using green screen) is greater than the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)          | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|----------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                            |               | blue value in the foreground image.                                                                                                                                                                                                                                                                                                                                                                             |
| brights (red smaller) | screen_brights_red_smaller | 100           | Excludes or includes bright areas from the screen overlay. This control only affects areas where the blue value (when using green screen) is greater than the red value in the foreground image.                                                                                                                                                                                                                |
| brights (red larger)  | screen_brights_red_larger  | 100           | Excludes or includes bright areas from the screen overlay. This control only affects areas where the red value (when using green screen) is greater than the blue value in the foreground image.                                                                                                                                                                                                                |
| orphans               | screen_orphans             | coarse        | Controls the level at which rogue orphan pixels are excluded from the screen overlay: <ul style="list-style-type: none"> <li>• <b>off</b> - no orphan pixels are removed automatically.</li> <li>• <b>coarse</b> - low level exclusion.</li> <li>• <b>medium</b> - medium level exclusion.</li> <li>• <b>fine</b> - high level exclusion.</li> </ul>                                                            |
| reset                 | reset                      | N/A           | Click to reset the <b>ScreenCorrect</b> settings to their default values.                                                                                                                                                                                                                                                                                                                                       |
| Shadows Tab           |                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                 |
| enable                | shadow                     | disabled      | When enabled, the <b>Shadows</b> controls are activated.<br><br>These are used to adjust the opacity, sharpness, and color of shadows with minimal effect on the foreground subject. Shadow processing relies on the internal synthetic clean plate and thus is only active if screen correct is also enabled.<br><br>The effects of the Shadows controls can be seen in both the matte and the color channels. |
| high                  | shadows_high               | 1             | Reduces or eliminates unwanted shadows that are lighter than those that are retained.<br><br>Note: All retained shadows are lightened by this                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                   |               | process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| low          | shadows_low       | 0             | Restores the density of the darkest part of retained shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| density      | shadows_density   | 100           | Adjusts the density of retained shadows. Higher values increase and lower values decrease the density.                                                                                                                                                                                                                                                                                                                                                                                          |
| blur         | shadows_blur      | 0             | Blurs any retained shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| tint         | shadows_tint      | 0             | Tints the color of any retained shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Spill Tab    |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| enable       | spill_suppression | enabled       | <p>When enabled, the <b>Spill</b> controls are activated.</p> <p>The Ultimatte algorithms automatically suppresses spill if spill suppression processing is enabled. Use the <b>Spill</b> controls to eliminate excessive spill and to restore color similar to the backing that has been inappropriately removed from the foreground.</p> <p>The effects of the <b>Spill</b> controls can be seen in the processed foreground, but are best judged using the <b>composite</b> output mode.</p> |
| cool         | spill_cool        | 50            | Adjusts the amount of spill in cool colored foreground objects. Used to reproduce blue, green, or cyan colors that changed through the spill suppression algorithms.                                                                                                                                                                                                                                                                                                                            |
| warm         | spill_warm        | 50            | Adjusts the amount of spill in warm colored foreground objects. Used to reproduce pink, purple, and magenta colors for bluescreen, or yellow and orange colors for greenscreen that changed through the spill suppression algorithms.                                                                                                                                                                                                                                                           |
| midtone      | spill_midtones    | 50            | Adjusts the amount of spill on midrange foreground objects.                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)       | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| brights            | spill_brights           | 100           | Adjusts the amount of spill on bright foreground objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| darks              | spill_darks             | 0             | Adjusts the amount of spill on dark foreground objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ambience           | spill_ambience          | 0.5           | Sets a color to subtly influence the foreground objects in areas that may have contained spill.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| strength           | spill_strength          | 40            | Adjusts the intensity of the ambient color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| background veiling | spill_backgroundveiling | 0.4           | <p>Sets the background veiling color used to override the automatic suppression of the backing color, which attempts to suppress the backing color to black.</p> <p>Increasing the value increases the amount of veiling (residue) left in the backing area. Decreasing the value increases suppression of that color in the screen area and can cause foreground edges and transparencies to shift color towards the channel's complementary color (cyan for red, magenta for green, and yellow for blue).</p> <div>  <b>Note:</b> In most cases this control can be left at the default value. </div> |
| reset              | reset                   | N/A           | Click to reset all <b>Spill</b> settings to their default values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Cleanup Tab        |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| enable             | cleanup                 | disabled      | <p>When enabled, the <b>Cleanup</b> controls are activated.</p> <p>These controls adjust the black and gray areas of the matte. This dramatically affects the foreground edges, the opacity of transparent objects, and the noise in the foreground image. They result in loss of foreground detail, so use sparingly, and whenever possible solve the problem using the <b>ScreenCorrect</b></p>                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                   |               | controls instead.<br><br>The effects of the <b>Cleanup</b> controls can be seen in both the matte and the color channels.                                                                                                                                                                                                                                                                                                   |
| cleanup      | cleanup_cleanup   | 100           | Reduces imperfections or small amounts of noise in the screen area. Lower values are sharper, higher values reduce more noise.<br><br> <b>Note:</b> Raising this setting too high results in a cut and paste look with a hard, unnatural edge.                                                                                             |
| shrink       | cleanup_shrink    | 0             | Reduces the size of the cleaned-up matte.                                                                                                                                                                                                                                                                                                                                                                                   |
| blur         | cleanup_blur      | 0             | Softens the cleaned-up matte.                                                                                                                                                                                                                                                                                                                                                                                               |
| recover      | cleanup_recover   | 0             | Sets a threshold below which the <b>Cleanup</b> controls have no effect.                                                                                                                                                                                                                                                                                                                                                    |
| Color Tab    |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                             |
| enable       | color_conformance | disabled      | When enabled, the <b>Color</b> controls are activated.<br><br>These controls apply a color correction to the processed foreground to better match the background. Use the Viewer toolbar match pickers to choose colors that should match and, if necessary, adjust the overall correction with the <b>Color</b> controls. The effects of the <b>Color</b> controls are best judged using the <b>composite</b> output mode. |
| darks        | color_darks       | 0.5           | Adjusts the darkest parts of the image. This is a global control, affecting the entire image, but the greatest effects are seen in the darkest areas.                                                                                                                                                                                                                                                                       |
| midtones     | color_midtones    | 0.5           | Adjusts the midtones parts of the image. This is a                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                      |
|--------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                   |               | global control, affecting the entire image, but the greatest effects are seen in the midtone areas.                                                                                                                                                                                                           |
| brights      | color_brights     | 0.5           | Adjusts the brightest parts of the image. This is a global control, affecting the entire image, but the greatest effects are seen in the lightest areas.                                                                                                                                                      |
| hue          | color_hue         | 0             | Adjusts the color contents of the image without changing its brightness or color intensity (purity) values. At default setting (0), the image hue is not altered.<br><br>The range of the control extends from -300 to +300.                                                                                  |
| saturation   | color_saturation  | 0             | Adjusts the color intensity or purity values of the image without altering its color contents or brightness values. At default setting (0), the image saturation is not altered.<br><br>At the minimum setting (-200), the color intensity is reduced to zero and the image is monochrome, or shades of gray. |
| brightness   | color_brightness  | 0             | Adjusts the overall intensity of the image. There is no change at the default setting of 0.                                                                                                                                                                                                                   |
| Film Tab     |                   |               |                                                                                                                                                                                                                                                                                                               |
| enable       | film              | disabled      | When enabled, the <b>Film</b> controls are activated.<br><br>These controls attempt to reduce the effects of cyan undercutting, a phenomenon that occurs due to the nature of film's emulsion layers. Cyan undercutting is typically not a problem until bluescreen keying techniques are applied.            |
| transparency | film_transparency | 100           | Adjusts the amount of film correction in partially transparent foreground areas (such as hair detail).<br><br>Transparency is most easily judged using the <b>composite</b> output mode.                                                                                                                      |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| correction   | film_correction  | 0.2, 0, 0     | Adjusts the amount of correction per-channel in the foreground image.<br><br>Corrections are most easily judged using the <b>composite</b> output mode. |
| strength     | film_strength    | 0             | Adjusts the overall amount of film <b>correction</b> applied to the foreground image.                                                                   |
| shrink       | film_shrink      | 2             | Erodes or dilates the subject overlay.                                                                                                                  |
| brights      | film_brights     | 200           | Includes or eliminates bright areas from the subject overlay.                                                                                           |
| darks        | film_darks       | 5             | Includes or eliminates dark areas from the subject overlay.                                                                                             |

# Merge Nodes

Merge nodes deal with layering multiple images together. The default mode is **over**, which simply places one image on top of another.

## Absminus

Absminus is the same as the [Merge](#) node, only with **operation** set to **difference** by default. It layers images together using the **difference** compositing algorithm: **abs(A-B)**. This algorithm calculates how much the pixels in input **A** differ from the pixels in input **B**. It can be useful for comparing two very similar images.

See also [Merge](#).

## AddMix

Using AddMix, the alpha of input **A** is used to index two color correction lookup curves (LUTs). The first is used to multiply input **A**, the second to multiply input **B**, and the results are added together. AddMix performs a similar operation to the Merge node's **over** mode, but also premultiplies your image. If you have a CG image that has been rendered, you're probably better off not using AddMix because you might lose detail by having your image premultiplied twice.

AddMix can be useful if your input contains a mask that covers a specific area and you want to only merge in that particular area, for instance if you have rotoscoped a particular shape and want to mix it using the roto shape as an alpha.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The first input sequence to mix (must include an alpha channel).                                                                                                                                                                                                                                                                                                   |
|                 | B               | The second input sequence to mix.                                                                                                                                                                                                                                                                                                                                  |
|                 | mask            | <p>An optional image to use as a mask. By default, merge is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                        |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| AddMix Tab    |                  |               |                                                                                                                                                 |
| A             | A                | rgba          | <p>Select the channels to use on the A input.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                 |
| B             | B                | rgba          | <p>Select the channels to use on the B input.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                 |
| output        | output           | rgba          | <p>Render into selected output channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                      |
| premultiplied | premultiplied    | Disabled      | Compensate for the A input being premultiplied. Colors in the A input are divided by their alpha before being multiplied by the A lookup curve. |
| nonlinear     | nonlinear        | Disabled      | Remap the zero to infinity range down into 0-1                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                     |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | logarithmically, so as to fit high dynamic range image details into the lookup curve range. This may improve results when merging high dynamic range images. |
| [A and B LUTs] | lut              | N/A           | View and adjust the color lookup curves for A and B inputs.                                                                                                  |
| reset          | N/A              | N/A           | Reset the A and B LUT curves back to the original values.                                                                                                    |
| mix            | mix              | 1             | Dissolve between the B input only and the merged result.                                                                                                     |

# Blend

Lets you blend images together by creating the weighted average of all of the inputs. You can continue to add more inputs, and more weight parameters will be added accordingly. This allows you to easily average together three, four, or more images and adjust how much each contributes to the result.

This node is particularly useful if you have multiple images to combine, allowing you to specify the amount to mix them by for each image. It is similar to using the [Merge](#) node, except if you wanted to merge more than two images with Merge nodes, you would have to chain multiple nodes.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | numbered inputs | The images you want to average together. Connect a minimum of two images to the numbered inputs.                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the blend effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                    |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blend Tab      |                  |               |                                                                                                                                                                                                             |
| channels       | channels         | all           | <p>The blend effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| [input number] | weight0          | 1             | The weight of each of the numbered inputs. The larger the value, the more the input in question contributes to the result.                                                                                  |
| normalize      | weight1          | enabled       | When enabled, the inputs are summed up and each of them divided by the total, so that the total doesn't exceed 1.0. This could help you avoid overexposed areas.                                            |
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                               |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the blend effect is limited to the non-black areas of this channel.                                                                                               |
| inject         | inject           | disabled      | Copies the mask input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                       |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel so that the blend effect is limited to the non-white areas of the mask.                                                                                                 |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                |
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                    |

# ContactSheet

Generates a contact sheet that shows the different inputs or the frames of one input lined up next to each other. This can help you demonstrate, document, or manage what you are doing for a project.

See also [LayerContactSheet](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | numbered inputs | The images you want to appear on the Contact Sheet. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                              |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ContactSheet Tab |                  |               |                                                                                                                                                                                                                       |
| Resolution       | width            | 3072          | Defines the size of the Contact Sheet in pixels.                                                                                                                                                                      |
|                  | height           | 2048          |                                                                                                                                                                                                                       |
| rows/columns     | rows             | 3             | Defines the number of rows and columns in the Contact Sheet.                                                                                                                                                          |
|                  | columns          | 4             |                                                                                                                                                                                                                       |
| gap              | gap              | 0             | Sets the gap, in pixels, around each input or frame.                                                                                                                                                                  |
| center           | center           | disabled      | When enabled, the input images are arranged so that the specified number of rows are centered vertically within the <b>Resolution</b> bounds.                                                                         |
| Row Order        | roworder         | BottomTop     | Sets the row display order: <ul style="list-style-type: none"> <li>• <b>TopBottom</b> - rows are populated from the top downward.</li> <li>• <b>BottomTop</b> - rows are populated from the bottom upward.</li> </ul> |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                      |
|------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Column Order                 | colorder         | LeftRight     | Sets the column display order: <ul style="list-style-type: none"> <li>• <b>LeftRight</b> - columns are populated from left to right.</li> <li>• <b>RightLeft</b> - columns are populated from right to left.</li> <li>• <b>Snake</b> - columns are populated in alternate directions, starting from left to right.</li> </ul> |
| Use frames instead of inputs | splitinputs      | disabled      | When enabled, the <b>FrameRange</b> specified is read from each input and displayed in the Contact Sheet.<br><br>For example, with 4 inputs and <b>FrameRange</b> set to 1-2, you'd see 8 plates displayed in the Contact Sheet (2 frames from each input).                                                                   |
| Frame Range                  | startframe       | -1            | Sets the frame range to extract from each input when <b>Use frames instead of inputs</b> is enabled.                                                                                                                                                                                                                          |
|                              | endframe         | -1            |                                                                                                                                                                                                                                                                                                                               |

# CopyBBox

Copies the bounding box from the **A** input onto the **B** stream. The bounding box defines the area of the frame that Nuke sees as having valid image data. The larger the bounding box is, the longer it takes Nuke to process and render the images.

Some Nuke operations, such as a merge, can cause an expansion of the bounding box area because Nuke does not know that the extra area is going to be black or another constant color. Often, you can fix this by copying the bounding box from one of the inputs to the resulting image, thus cutting off the extra area.

See also [AdjustBBox](#).

# CopyRectangle

With the CopyRectangle node, you can copy a rectangular area from one input on top of another.

The CopyRectangle node can also be used to limit effects, such as color corrections, to a small rectangular region of an image. To do so, you need to use the same image in both input **A** and **B** and only perform the color correction on one input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                      |
|-----------------|-----------------|-----------------------------------------------|
| Input           | A               | The image from which the rectangle is copied. |
|                 | B               | The image to which the rectangle is copied.   |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                       |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CopyRectangle Tab |                  |               |                                                                                                                                                                                                                                |
| channels          | channels         | all           | <p>Sets the channels to copy from input A within the specified rectangle.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| area xyrt         | area             | 512           | Sets the bounds of the copy rectangle on the xy axes and the rectangle position from the right and top.                                                                                                                        |
|                   |                  | 389           |                                                                                                                                                                                                                                |
|                   |                  | 1536          |                                                                                                                                                                                                                                |
|                   |                  | 1167          |                                                                                                                                                                                                                                |
| softness          | softness         | 0             | <p>Allows you to vignette the edges of the copied rectangle. The larger the value, the more of the area around the edges is faded to input B.</p> <p>A value of 0 produces no vignetting.</p>                                  |
| mix               | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                            |



# Dissolve

Dissolve creates a weighted average of two inputs.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | 0-9999          | The image sequences to mix between.                                                                                                                                                                                                                                                                                                                                              |
|                 | mask            | <p>An optional image to use as a mask. By default, the dissolve effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dissolve Tab |                  |               |                                                                                                                                                                                                                                                                                                                |
| channels     | channels         | all           | <p>The dissolve effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                 |
| which        | which            | 0             | <p>Select the inputs to dissolve between.</p> <p>Set this to an integer (whole number) to show that input, or a fractional value to dissolve between the two nearest inputs. For example, if you set this to 3, Nuke displays input 3. If you set this to 3.5, Nuke displays a mix between inputs 3 and 4.</p> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right.                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                  |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the dissolve is limited to the non-black areas of this channel.                                    |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the dissolve is limited to the non-white areas of the mask.                                      |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                 |

# In

In is the same as the [Merge](#) node, only with **operation** set to **in** by default. It layers images together using the **in** compositing algorithm: **Ab**. This algorithm only shows the areas of image **A** that overlap with the alpha of **B**. It can be useful for combining mattes.

See also [Merge](#).

# Keymix

Keymix layers two images together using a specified Roto shape or image as a mask. It copies input **A** to input **B** where the **mask** is non-black. This follows the formula **Aa + B(1-a)**. It is similar to the Over node, but for use with unpremultiplied images. The resulting image contains no alpha channel.

See also **Over** within the [Merge](#) node table.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                      |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The image sequence to merge with input <b>B</b> . By default, this input is copied to input <b>B</b> only where the <b>mask</b> is non-black. |
|                 | B               | The image sequence to merge with input <b>A</b> .                                                                                             |
|                 | mask            | The image to use as a mask. By default, the effect of input <b>A</b> is limited to the non-black areas of the mask.                           |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keymix Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| channels     | channels         | all           | The channels to copy from input <b>A</b> .<br><br>Any other channels are copied unchanged from input <b>B</b> .                                                                                                                                                                                                                                                                                                        |
| mask channel | N/A              | enabled       | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                          |
|              | maskChannel      | rgba.alpha    | The channel to use as a mask. By default, the effect of input <b>A</b> is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                              |
| invert       | invertMask       | disabled      | Inverts the use of the mask channel so that the effect of input <b>A</b> is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                |
| mix          | mix              | 1             | Dissolves between the original <b>B</b> input at 0 and the full Keymix effect at 1.                                                                                                                                                                                                                                                                                                                                    |
| Set BBox to  | bbox             | union         | How to output the bounding box: <ul style="list-style-type: none"> <li>• <b>union</b> - combine the two bounding boxes.</li> <li>• <b>B side</b> - use the bounding box from input <b>B</b>. Any data from the <b>A</b> input that's outside this box is clipped.</li> <li>• <b>A side</b> - use the bounding box from input <b>A</b>. Any data from the <b>B</b> input that's outside this box is clipped.</li> </ul> |

# LayerContactSheet

Generates a contact sheet that shows all the layers in the input lined up next to each other. This can help you demonstrate, document, or manage what you are doing for a project.

See also [ContactSheet](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | numbered inputs | The images you want to appear on the Contact Sheet. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                      |
|------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| LayerContactSheet Tab  |                  |               |                                                                                                                                               |
| Resolution             | width            | 3072          | Defines the size of the Contact Sheet in pixels.                                                                                              |
|                        | height           | 2048          |                                                                                                                                               |
| rows/columns           | rows             | 3             | Defines the number of rows and columns in the Contact Sheet when <b>automatic rows/columns</b> is disabled.                                   |
|                        | columns          | 4             |                                                                                                                                               |
| automatic rows/columns | autodims         | enabled       | When enabled, the number of rows and columns is auto-calculated.                                                                              |
| gap                    | gap              | 0             | Sets the gap, in pixels, around each input.                                                                                                   |
| center                 | center           | disabled      | When enabled, the input images are arranged so that the specified number of rows are centered vertically within the <b>Resolution</b> bounds. |
| Row Order              | roworder         | BottomTop     | Sets the row display order: <ul style="list-style-type: none"> <li>• <b>BottomTop</b> - rows are populated from the bottom upward.</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"> <li>• <b>TopBottom</b> - rows are populated from the top downward.</li> </ul>                                                                                                        |
| Column Order     | colorder         | LeftRight     | Sets the column display order: <ul style="list-style-type: none"> <li>• <b>LeftRight</b> - columns are populated from left to right.</li> <li>• <b>RightLeft</b> - columns are populated from right to left.</li> </ul> |
| Show layer names | showLayerNames   | disabled      | When enabled, the layers on the Contact Sheet are labeled with the associated channel name.                                                                                                                             |

# Matte

Matte is the same as the [Merge](#) node, only with **operation** set to **matte** by default. It layers images together using the **matte** compositing algorithm:  **$Aa + B(1-a)$** . This algorithm is the same as a premultiplied **over**. You should use unpremultiplied images with this operation.

# Max

Max is the same as the [Merge](#) node, only with **operation** set to **max** by default. It layers images together using the **max** compositing algorithm:  **$\max(A,B)$** . This algorithm outputs the maximum value for each channel of each pixel. It can be useful for combining mattes and bringing aspects like bright hair detail through.

# Merge

Merge allows you to layer multiple images together. When using this node, you need to select a compositing algorithm that determines how the pixel values from one input are calculated with the pixel values from the

other to create the new pixel values that are output as the merged image. The **operation** dropdown menu houses a large number of different compositing algorithms, giving you great flexibility when building your composite.

When using most of the available merge algorithms, Nuke expects premultiplied input images. However, with the **matte** operation you should use unpremultiplied images.

You can also create this node by pressing **M** on the Node Graph.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The image sequence to merge with input B. When you connect the A input, a new input A1, A2, etc. is spawned allowing you to connect multiple image.                                                                                                                                                                                                                       |
|                 | B               | The image sequence to merge with input A.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the merge is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control isn't disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Merge Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| operation    | operation        | over          | <p>Sets the Merge algorithm to use:</p> <ul style="list-style-type: none"> <li>• <b>atop</b> - Shows the shape of image <b>B</b>, with <b>A</b> covering <b>B</b> where the images overlap. Algorithm: <b><math>A \cdot B + B(1 - a)</math></b></li> <li>• <b>average</b> - The average of the two images. The result is darker than the original images. Algorithm: <b><math>(A + B)/2</math></b></li> <li>• <b>color-burn</b> - Image <b>B</b> gets darker based on the</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>luminance of <b>A</b>. Algorithm: <b>darken B towards A</b></p> <ul style="list-style-type: none"> <li>• <b>color-dodge</b> - Image <b>B</b> gets brighter based on the luminance of <b>A</b>. Algorithm: <b>brighten B towards A</b></li> <li>• <b>conjoint-over</b> - Similar to the <b>over</b> operation, except that if a pixel is partially covered by both <b>a</b> and <b>b</b>, conjoint-over assumes <b>a</b> completely hides <b>b</b>. For instance, two polygons where <b>a</b> and <b>b</b> share some edges but <b>a</b> completely overlaps <b>b</b>. Normal <b>over</b> produces a slightly transparent seam here. Algorithm: <b>A+B(1-a)/b, A if a&gt;b</b></li> <li>• <b>copy</b> - Only shows image <b>A</b>. This is useful if you also set the <b>mix</b> or <b>mask</b> controls so that some of <b>B</b> can still be seen. Algorithm: <b>A</b></li> <li>• <b>difference</b> - How much the pixels differ. See also <a href="#">Absminus</a>. Algorithm: <b>abs(A-B)</b></li> <li>• <b>disjoint-over</b> - Similar to the <b>over</b> operation, except that if a pixel is partially covered by both <b>a</b> and <b>b</b>, disjoint-over assumes the two objects do not overlap. For instance, two polygons that touch and share an edge. Normal <b>over</b> produces a slightly transparent seam here. Algorithm: <b>A+B(1-a)/b, A+B if a+b&lt;1</b></li> <li>• <b>divide</b> - Divides the values but stops two negative values from becoming a positive number. Algorithm: <b>A/B, 0 if A&lt;0 and B&lt;0</b></li> <li>• <b>exclusion</b> - A more photographic form of <b>difference</b>. Algorithm: <b>A+B-2AB</b></li> <li>• <b>from</b> - Image <b>A</b> is subtracted from <b>B</b>. Algorithm: <b>B-A</b></li> <li>• <b>geometric</b> - Another way of averaging two images. Algorithm: <b>2AB/(A+B)</b></li> <li>• <b>hard-light</b> - Image <b>B</b> is lit up by a very bright and sharp light in the shape of image <b>A</b>. Algorithm:</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p><b>multiply if A&lt;.5, screen if A&gt;.5</b></p> <ul style="list-style-type: none"> <li>• <b>hypot</b> - Resembles the plus and screen operations. The result is not as bright as plus, but brighter than screen. Hypot works with values above 1. Algorithm: <b>diagonal sqrt(A*A+B*B)</b></li> <li>• <b>in</b> - Only shows the areas of image <b>A</b> that overlap with the alpha of <b>B</b>. See also <a href="#">In</a>. Algorithm: <b>Ab</b></li> <li>• <b>mask</b> - This is the reverse of the <b>in</b> operation. Only shows the areas of image <b>B</b> that overlap with the alpha of <b>A</b>. Algorithm: <b>Ba</b></li> <li>• <b>matte</b> - Premultiplied over. Use unpremultiplied images with this operation. See also <a href="#">Matte</a>. Algorithm: <b>Aa+B(1-a) (unpremultiplied over)</b></li> <li>• <b>max</b> - Takes the maximum values of both images. See also <a href="#">Max</a>. Algorithm: <b>max(A,B)</b></li> <li>• <b>min</b> - Takes the minimum values of both images. See also <a href="#">Min</a>. Algorithm: <b>min(A,B)</b></li> <li>• <b>minus</b> - Subtracts B from A. Algorithm: <b>A-B</b></li> <li>• <b>multiply</b> - Multiplies the values but stops two negative values from becoming a positive number. See also <a href="#">Multiply</a>. Algorithm: <b>AB, A if A&lt;0 and B&lt;0</b></li> <li>• <b>out</b> - Only shows the areas of image <b>A</b> that do not overlap with the alpha of <b>B</b>. See also <a href="#">Out</a>. Algorithm: <b>A(1-b)</b></li> <li>• <b>over</b> - This is the default operation. Layers image <b>A</b> over <b>B</b> according to the alpha of image <b>A</b>. Algorithm: <b>A+B(1-a)</b></li> <li>• <b>overlay</b> - Image <b>A</b> brightens image <b>B</b>. Algorithm: <b>multiply if B&lt;.5, screen if B&gt;.5</b></li> <li>• <b>plus</b> - The sum of image <b>A</b> and <b>B</b>. Note that the <b>plus</b> algorithm may result in pixel values higher than 1.0. See also <a href="#">Plus</a>. Algorithm: <b>A+B</b></li> </ul> |



| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"> <li>• <b>screen</b> - If <b>A</b> or <b>B</b> is less than or equal to 1 the <b>screen</b>, else use the maximum example. Similar to <b>plus</b>. See also <a href="#">Screen</a>. Algorithm: <b><math>A+B-AB</math> if <b>A</b> and <b>B</b> between 0-1, else <b>A</b> if <b>A</b>&gt;<b>B</b> else <b>B</b></b></li> <li>• <b>soft-light</b> - Image <b>B</b> is lit up. Similar to <b>hard-light</b>, but not as extreme. Algorithm: <b><math>B(2A+(B(1-AB)))</math> if <math>AB&lt;1</math>, <math>2AB</math> otherwise</b></li> <li>• <b>stencil</b> - This is the reverse of the <b>out</b> operation. Only shows the areas of image <b>B</b> that do not overlap with the alpha of <b>A</b>. Algorithm: <b><math>B(1-a)</math></b></li> <li>• <b>under</b> - This is the reverse of the <b>over</b> operation. Layers image <b>B</b> over <b>A</b> according to the matte of image <b>B</b>. Algorithm: <b><math>A(1-b)+B</math></b></li> <li>• <b>xor</b> - Shows both image <b>A</b> and <b>B</b> where the images do not overlap. Algorithm: <b><math>A(1-b)+B(1-a)</math></b></li> </ul> |
| Video colorspace | sRGB             | disabled      | When enabled, colors are converted to the default 8-bit colorspace ( <b>ProjectSettings &gt; LUT &gt; 8-bit files</b> ) before doing the composite and results are converted back to linear afterwards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| alpha masking    | screen_alpha     | disabled      | <p>When enabled, the input images are unchanged where the other image has zero alpha, and the output alpha is set to <b><math>a+b-a*b</math></b>.</p> <p>When disabled, the same math is applied to the alpha as is applied to the other channels.</p> <div>  <b>Note:</b> This option is disabled on operations where it makes no difference or PDF/SVG specifications says it should not apply. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| set bbox to      | bbox             | union         | <p>Sets the output bounding box type and any data outside this region is clipped off:</p> <ul style="list-style-type: none"> <li>• <b>union</b> - Resize the output bbox to fit both input</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>bboxes completely.</p> <ul style="list-style-type: none"> <li>• <b>intersection</b> - Use only those parts of the image where the input bboxes overlap.</li> <li>• <b>A</b> - Use input A's bbox.</li> <li>• <b>B</b> - Use input B's bbox.</li> </ul>                                                       |
| metadata from | metainput        | B             | <p>Sets which input's metadata is passed down the node tree.</p> <div>  <b>Note:</b> When <b>metadata from</b> is set to <b>All</b> and there are keys with the same name in both inputs, keys in B override keys in A. </div> |
| range from    | rangeinput       | B             | <p>Sets which input's range is passed down the node tree.</p>                                                                                                                                                                                                                                                   |
| A channels    | Achannels        | rgba          | <p>Sets the channels from the A input(s) to merge with the B channels, and which channel to treat as the A alpha.</p> <div>  <b>Note:</b> Setting <b>A channels</b> to none is the same as black or zero. </div>             |
| B channels    | Bchannels        | rgba          | <p>Sets the channels to use from the B input, and which channel to treat as the B alpha.</p>                                                                                                                                                                                                                    |
| output        | output           | rgba          | <p>Sets the channels to which the merge of the A and B channels are written.</p>                                                                                                                                                                                                                                |
| also merge    | also_merge       | none          | <p>Sets the channels that are merged in addition to those specified in the A channels and B channels controls.</p>                                                                                                                                                                                              |
| mask          | N/A              | disabled      | <p>Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p>                                                                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              | maskChannelInput | none          | The channel to use as a mask. By default, the merge is limited to the non-black areas of this channel.                                       |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the merge is limited to the non-white areas of the mask.                                        |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask.                 |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full merge at 1.                                                                           |

# MergeExpression

Allows you to merge two images using Tcl expressions. The syntax is the same as for the **Color > Math > Expression** node, except that you need to precede channel references with either **A** or **B** to indicate the input. For example, to reference the red, green, blue, and alpha channels of input **A**, you should use **Ar**, **Ag**, **Ab**, and **Aa**. Similarly, to reference these channels in input **B**, use **Br**, **Bg**, **Bb**, and **Ba**.

To reference pixels in other layers, use **INPUTlayer.channel**, for example **Bmatte.garbage**. If you don't specify a layer, Nuke assumes the channel is in the current layer, for example **Bgarbage**.

For more information on the syntax for Tcl expressions, see Nuke's [online help](#) in the Nuke or select **Help > Documentation > Knob Math Expressions** in Nuke.

See also [Expression](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The image sequence to merge with input B.                                                                                                                                                                                                                                                                                                                                 |
|                 | B               | The image sequence to merge with input A.                                                                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the merge is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control isn't disabled or set to <b>none</b>.</p> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                       |
|-----------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MergeExpression       |                  |               |                                                                                                                                                                                                                                                                                                                                |
| [variable name field] | temp_name0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign.                                                                                                              |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                       |
|-----------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | You can then use the variable to represent the expression in the = fields next to the channels.                                                                                                                                                                                                                                |
| =                     | temp_expr1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |
| [variable name field] | temp_name3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the channels.              |
| =                     | temp_expr3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the channels. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels     | channel0         | red           | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| =            | expr0            | N/A           | <p>The expression to apply to the above channels.</p> <p>You need to precede channel references with either <b>A</b> or <b>B</b> to indicate the input. For example, to reference the red, green, blue, and alpha channels of input <b>A</b>, you should use <b>Ar</b>, <b>Ag</b>, <b>Ab</b>, and <b>Aa</b>. Similarly, to reference these channels in input B, use <b>Br</b>, <b>Bg</b>, <b>Bb</b>, and <b>Ba</b>.</p> <p>To reference pixels in other layers, use <b>INPUTlayer.channel</b>, for example <b>Bmatte.garbage</b>. If you don't specify a layer, Nuke assumes the channel is in the current layer, for example <b>Bgarbage</b>.</p> |
| channels     | channel1         | green         | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| =            | expr1            | N/A           | <p>The expression to apply to the above channels.</p> <p>You need to precede channel references with either <b>A</b> or <b>B</b> to indicate the input. For example, to reference the red, green, blue, and alpha channels of input <b>A</b>, you should use <b>Ar</b>, <b>Ag</b>, <b>Ab</b>, and <b>Aa</b>. Similarly, to reference these channels in input B, use <b>Br</b>, <b>Bg</b>, <b>Bb</b>, and <b>Ba</b>.</p> <p>To reference pixels in other layers, use <b>INPUTlayer.channel</b>, for example <b>Bmatte.garbage</b>. If you don't specify a layer, Nuke assumes the channel is in the current layer, for example <b>Bgarbage</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels     | channel2         | blue          | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| =            | expr2            | N/A           | <p>The expression to apply to the above channels.</p> <p>You need to precede channel references with either <b>A</b> or <b>B</b> to indicate the input. For example, to reference the red, green, blue, and alpha channels of input <b>A</b>, you should use <b>Ar</b>, <b>Ag</b>, <b>Ab</b>, and <b>Aa</b>. Similarly, to reference these channels in input B, use <b>Br</b>, <b>Bg</b>, <b>Bb</b>, and <b>Ba</b>.</p> <p>To reference pixels in other layers, use <b>INPUTlayer.channel</b>, for example <b>Bmatte.garbage</b>. If you don't specify a layer, Nuke assumes the channel is in the current layer, for example <b>Bgarbage</b>.</p> |
| channels     | channel3         | alpha         | <p>The channel(s) to which you want to apply the expression in the below = field.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| =            | expr3            | N/A           | <p>The expression to apply to the above channels.</p> <p>You need to precede channel references with either <b>A</b> or <b>B</b> to indicate the input. For example, to reference the red, green, blue, and alpha channels of input <b>A</b>, you should use <b>Ar</b>, <b>Ag</b>, <b>Ab</b>, and <b>Aa</b>. Similarly, to reference these channels in input B, use <b>Br</b>, <b>Bg</b>, <b>Bb</b>, and <b>Ba</b>.</p> <p>To reference pixels in other layers, use <b>INPUTlayer.channel</b>, for example <b>Bmatte.garbage</b>. If you don't specify a layer, Nuke assumes the channel is in the current layer, for example <b>Bgarbage</b>.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mask           | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                     |
|                | maskChannelInput | none          | The channel to use as a mask. By default, the merge is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                            |
| inject         | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                      |
| invert         | invert_mask      | disabled      | Inverts the use of the mask channel, so that the merge is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                             |
| fringe         | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                                                                                                                                                                                                                                                                                      |
|                |                  |               | When disabled, the effect is applied to the entire mask.                                                                                                                                                                                                                                                                                                                                                          |
| (un)premult by | N/A              | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                          |
|                | unpremult        | none          | <p>The image is divided by this channel before being processed, and multiplied again afterwards.</p> <p>If you are using premultiplied input images, you may want to check <b>(un)premult by</b> and select <b>rgba.alpha</b> here. This will simulate doing the merge before the premultiplication was done.</p> <p>If you are using unpremultiplied input images, you should leave this set to <b>none</b>.</p> |
| invert         | invert_unpremult | disabled      | Inverts the use of the (un)premultiply channel.                                                                                                                                                                                                                                                                                                                                                                   |
| mix            | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                                                                                                                                                                                                                                                                                               |



# Min

Min is the same as the [Merge](#) node, only with **operation** set to **min** by default. It layers images together using the **min** compositing algorithm: **min(A,B)**. This algorithm outputs the minimum value for each channel of each pixel.

See also [Merge](#).

# Multiply

Multiply is the same as the [Merge](#) node, only with **operation** set to **multiply** by default. It layers images together using the **multiply** compositing algorithm: **AB, A if A<0 and B<0**. This algorithm multiplies the pixel channel values but takes the value of **A** if both **A** and **B** are negative. It can be useful for compositing darker values from **A** with the image of **B** - dark gray smoke shot against a white background, for example.

It can also be used to add a grain plate to an image regrained with [F\\_ReGrain](#).

See also [Merge](#).

# Out

Out is the same as the [Merge](#) node, only with **operation** set to **out** by default. The Out node can be useful for combining mattes. It layers images together using the **out** compositing algorithm: **A(1-b)**, where **b** is the alpha value of a pixel from image **B**. This algorithm only shows the areas of image **A** that overlap areas of **B** which are rejected when using **B** in a matte.

See also [Merge](#).

# Plus

Plus is the same as the [Merge](#) node, only with **operation** set to **plus** by default. It layers images together using the **plus** compositing algorithm: **A+B**. This algorithm calculates the sum of image **A** and **B**. Note that it may result in pixel values higher than 1.0.

Plus can be useful for compositing laser beams, but you're better off not using this one for combining mattes.

# Premult

By default, Premult multiplies the input's rgb channels by its alpha (in other words, premultiplies the input image). You may need this node when:

- **Merging unpremultiplied images.** Because Merge nodes in Nuke expect premultiplied images, you should use this node before any Merge operations if your input images are unpremultiplied. This avoids unwanted artifacts, such as fringing around masked objects.
- **Color correcting premultiplied images.** When you color correct a premultiplied image, you should first connect an Unpremult node to the image to turn the image into an unpremultiplied one. Then, perform the color correction. Finally, add a Premult node to return the image to its original premultiplied state for Merge operations.

Typically, most 3D rendered images are premultiplied. As a rule of thumb, if the background is black or even just very dark, the image may be premultiplied.

See also [Unpremult](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | unnamed         | The unpremultiplied image sequence you want to premultiply. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|
| Premult Tab  |                  |               |                                                                                                                          |
| multiply     | channels         | rgb           | The channels to multiply (usually rgb).<br><br>You can use the checkboxes on the right to select individual channels.    |
| by           | N/A              | enabled       | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|              | alpha            | rgba.alpha    | Multiply the above channels by this channel (usually alpha).                                                             |
| invert       | invert           | disabled      | Inverts the use of the alpha channel.                                                                                    |

# Screen

Screen is the same as the [Merge](#) node, only with **operation** set to **screen** by default. It layers images together using the **screen** compositing algorithm:  **$A+B-AB$  if  $A$  or  $B \leq 1$ , otherwise  $\max(A,B)$** . In other words, if **A** or **B** is less than or equal to 1, the **screen** algorithm is used, otherwise **max** is chosen. Screen resembles **plus**. It can be useful for combining mattes and adding laser beams.

See also [Merge](#).

# Switch

Lets you switch between any number of inputs. This can be useful when using gizmos.

See also [VariableSwitch](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                 |
|-----------------|-----------------|------------------------------------------|
| Input           | 0,1, 2, 3, 4... | The inputs you intend to switch between. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Switch Tab   |                  |               |                                                                                                                                                                                                                                                                                                               |
| which        | which            | 0             | <p>The input to display. Each input is displayed at the value corresponding to the number of the input. For example:</p> <ul style="list-style-type: none"> <li>• Setting <b>which</b> to 4 displays the image from input 4.</li> <li>• Setting <b>which</b> to 6 displays the image from input 6.</li> </ul> |

## TimeDissolve

Dissolves between two inputs, starting the dissolve at the **in** frame and ending at the **out** frame. You can specify the dissolve curve over time.

## Inputs and Controls

| Connection Type | Connection Name | Function                               |
|-----------------|-----------------|----------------------------------------|
| Input           | A               | The input you intend to dissolve from. |
|                 | B               | The input you intend to dissolve to.   |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                              |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeDissolve Tab |                  |               |                                                                                                                                                                                                                                       |
| in               | in               | 1             | Sets the frame to begin the dissolve over time.                                                                                                                                                                                       |
| out              | out              | 10            | Sets the frame to end the dissolve.                                                                                                                                                                                                   |
| Curves           | lut              | N/A           | Use the curve to define how the dissolve behaves in the frame range: <ul style="list-style-type: none"> <li>• <b>0</b> - the frame before the <b>in</b> frame.</li> <li>• <b>1</b> - the frame after the <b>out</b> frame.</li> </ul> |
| Reset            | N/A              | N/A           | Click to reset the curve to the default shape.                                                                                                                                                                                        |

# Unpremult

By default, this node divides the input's rgb channels by its alpha. If your input images are premultiplied, this can make color corrections more accurate.

When you color correct premultiplied images, you should first connect an Unpremult node to the image to turn the image into an unpremultiplied one. Then, apply the color correction. Finally, add a Premult node to return the image to its original premultiplied state - this last step is important if you want to merge the image over another one, as Merge nodes in Nuke expect premultiplied images.

Typically, most 3D rendered images are premultiplied. As a rule of thumb, if the background is black or even just very dark, the image may be premultiplied.

See also [Premult](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                       |
|-----------------|-----------------|----------------------------------------------------------------|
| Input           | unnamed         | The premultiplied image sequence to receive the unpremultiply. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                       |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| Unpremult Tab |                  |               |                                                                                                                                |
| divide        | channels         | rgb           | The channels to divide (usually rgb).<br><br>You can use the checkboxes on the right to select individual channels.            |
| by            | N/A              | enabled       | Enables the associated alpha channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> . |
|               | alpha            | rgba.alpha    | Divide the above channels by this channel (usually alpha).                                                                     |
| invert        | invert           | disabled      | Inverts the use of the alpha channel.                                                                                          |

# VariableSwitch

This node allows you to switch seamlessly between inputs, Variables, and scopes, customizing which are in use in your script.

See more at [VariableSwitch Node in a Multishot Context](#).

## Inputs and Controls

| Connection Type | Connection Name                   | Function                                                       |
|-----------------|-----------------------------------|----------------------------------------------------------------|
| Inputs          | i0, i1, i2, i3, i4<br>(and so on) | The nodes you wish to connect in order to switch between them. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------|
| variable     | variable         | N/A           | The options in this dropdown are derived from the Variables set in the Variables tab in Project Settings. |

| Control (UI) | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                                              |
|--------------|--------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| patterns     | i0, i1, i2, i3, i4 (and so on) | N/A           | A pattern knob appears for each input that the node has. Type Variable names into these patterns to define the inputs that are active on the node. The Variables should match the ones you have defined in the Variables tab in the Project Settings. |

# ZMerge

Merges input images together at their appropriate 3D depths. It does this by setting each output pixel to the input with the closest Z depth value. Z depth values are usually stored in a separate depth channel (for example, **depth.z**) and determine the placing of objects within the field of view of the camera. By default, ZMerge considers smaller Z depth values (darker areas) to be closer to the camera and larger values (lighter areas) further away, but you can invert this behavior.

You can use ZMerge as an alternative to creating holdout geometry, but note that you may get poor results or have problems with anti-aliasing if your input images include transparent areas or motion blur.

See also [Deep Nodes](#).

## Inputs and Controls

| Connection Type | Connection Name   | Function                                                                                                                                                                                                                                                                                              |
|-----------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | [numbered inputs] | <p>Images to merge together based on their Z depth values.</p> <p>Each input should include a Z depth channel describing the depth of the objects in that image. ZMerge merges the depth channels from all inputs and uses the result to determine what input each output pixel should come from.</p> |

| Control (UI)             | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                     |
|--------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ZMerge Tab               |                  |               |                                                                                                                                                                                                                                                                              |
| Z channel                | N/A              | enabled       | Enables the associated Z channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                   |
|                          | z_channel        | depth.Z       | The channel with the Z depth values. This should be the same for each input. For example, if you are merging two inputs, both data streams should have a Z depth channel in the channel specified here.                                                                      |
| smaller Z = further away | backwards        | disabled      | <p>When enabled, darker Z values are further away and hidden by lighter Z values. This is correct for Nuke and Pixar's RenderMan renderer, which output 1/distance.</p> <p>When disabled, lighter Z values are further away and hidden by darker Z values.</p>               |
| Alpha channel            | N/A              | enabled       | Enables the associated alpha channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                               |
|                          | alpha_channel    | rgba.alpha    | When enabled, ZMerge uses the inputs' alpha channels to blend between the foreground and background. You may want to check this if your input elements have alpha channels and you have a depth map that covers the entire scene (rather than just the individual elements). |



# Transform Nodes

Transform nodes deal with translation, rotation, and scale as well as tracking, warping, and motion blur.

## AdjustBBox

The AdjustBBox node lets you expand or crop the edges of the bounding box by a specified number of pixels. The bounding box defines the area of the frame that Nuke sees as having valid image data. For example, if you have an image with lots of black (0,0,0,0), you can adjust the bounding box to contain just the useful area so that Nuke won't waste time computing results where there is no change.

### Inputs and Controls

| Connection Type | Connection Name | Function                                |
|-----------------|-----------------|-----------------------------------------|
| Input           | unnamed         | The image whose bounding box to resize. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AdjBBox Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                  |
| Add Pixels   | numpixels        | 25            | <p>Adjust the width and height of the input image's bounding box by adding or removing pixels. Click the <b>2</b> button to display separate fields for width (<b>w</b>) and height (<b>h</b>).</p> <p>If you crop the bounding box, the edge pixels of the bounding box area get replicated towards the edges of the image.</p> |

# BlackOutside

The BlackOutside node fills everything outside the bounding box area with black. This removes stripes or other anomalies caused by the edge pixels of the bounding box being replicated. It may be useful, for example, after adjusting the bounding box with an [AdjustBBox](#) or [CopyBBox](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------|
| Input           | unnamed         | The image whose edges outside the bounding box you want to fill with black. |

# CameraShake

Adds simulated camera shake to a sequence using random changes in amplitude, rotation, scale, and so on. Also includes shutter controls to produce motion blur.

## Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | unnamed         | The sequence to which the camera shake is applied. |

| Control (UI)    | Knob (Scripting) | Default Value | Function |
|-----------------|------------------|---------------|----------|
| CameraShake Tab |                  |               |          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| amplitude      | amplitude        | 10            | Sets the size (pixels) of the shake.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| rotation       | rotation         | 0             | Sets the maximum rotation (degrees) around the <b>cs_center</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| scaling        | scaling          | 0             | Sets the maximum scale fluctuation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| frequency      | frequency        | 0.5           | Sets the lowest frequency (cycles per frame) of the shake.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| octaves        | octaves          | 2             | Adds higher frequency to the camera shake, in addition to the basic shake, producing a more random shake.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| seed           | seed             | 0             | <p>Sets the seed used to create the random shake pattern. You can change this number to produce a slightly different pattern.</p> <p>You can copy this seed to other CameraShake nodes to copy the shake motion.</p>                                                                                                                                                                                                                                                                                                          |
| Randomize Seed | randomize_seed   | N/A           | Click to create a random seed for the shake pattern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| fixed scale    | scale            | 1             | Scales the sequence to ensure the edges of the image don't enter the frame during extreme camera shake.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| center xy      | cs_center        | N/A           | The center of the camera shake scale and rotation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| filter         | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| clamp        | clamp            | disabled      | When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| crop         | black_outside    | disabled      | <p>When disabled, the outside area is filled with the outermost pixels of the image sequence.</p> <p>When enabled, this renders as black pixels outside the image boundary, making it easier to layer the element over another.</p> <div>  <b>Note:</b> This control also adds a solid alpha covering the input image area if no alpha is present. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| motionblur     | motionblur       | 1             | <p>Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter        | shutter          | 0.5           | <p>Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| shutter offset | shutteroffset    | centered      | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                |
|--------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame. |

# Card3D

The Card3D node lets you apply the same geometric transformations possible with the Transform node, but gives you an additional axis of operation, z. It transforms the image as though it was printed on a flat card and placed in front of the camera. The Card3D node's transformations are not truly 3D, but rather what is sometimes called "2.5D" - meaning that you can move an element back on the z axis, but doing so does not convey the sense that it is behind or in front of another element. 2.5D transformations are useful for tasks like "cheating" the perspective of an element or "faking" a camera zoom.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | An optional Axis node that works as null object to which the card can be parented. If connected, you can use the Axis transformation controls to control the Card3D node. Rotating the Axis node, for example, rotates the Card3D node. This can be useful if you want to control several nodes using the same Axis node. |
|                 | cam             | An optional Camera node used for viewing the card.                                                                                                                                                                                                                                                                        |
|                 | unnamed         | The image to place on the card.                                                                                                                                                                                                                                                                                           |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Card3D Tab                                                                        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|  | file_menu        | N/A           | <p>The File Menu lets you:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - Import a channel file and move the card according to the transformation data in that file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - Export the transformation data you have applied to the card as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                           |
|  | snap_menu        | N/A           | <p>The Snap Menu lets you:</p> <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - match the position of the card to any vertices you have selected on a 3D geometry object in the Viewer.</li> <li>• <b>Match selection position, orientation</b> - match the position and orientation of the card to any vertices you have selected on a 3D geometry object in the Viewer.</li> <li>• <b>Match selection position, orientation, size</b> - match the position, orientation, and size of the card to any vertices you have selected on a 3D geometry object in the Viewer.</li> </ul> <p>To select vertices in the Viewer, you need to attach a 3D object to the Viewer and press <b>Tab</b> to activate the Viewer's 3D mode. Then, click  to activate the <b>Vertex selection</b> tool, and select vertices on the object by dragging a marquee over them.</p> |
| transform order                                                                   | xform_order      | SRT           | Select the order by which Nuke executes scales, rotations, and translations ( <b>S</b> signifies scale, <b>R</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | rotation, and <b>T</b> translation). The order can affect the outcome.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| rotation order | rot_order        | ZXY           | Select the order by which Nuke executes rotation on individual axes ( <b>X</b> , <b>Y</b> , and <b>Z</b> ).                                                                                                                                                                                                                                                                                                                                                                                              |
| translate xyz  | translate        | 0, 0, -1      | Translates the card on the x,y, and z axes.<br><br>Alternatively, you can drag on any axis on the transformation overlay in the Viewer.                                                                                                                                                                                                                                                                                                                                                                  |
| rotate xyz     | rotate           | 0, 0, 0       | Rotates the card on the x, y, and z axes. This is useful for cheating the perspective.<br><br>Alternatively, you can press <b>Ctrl/Cmd</b> while dragging on any axis on the transformation overlay in the Viewer.                                                                                                                                                                                                                                                                                       |
| scale xyz      | scaling          | 1, 1, 1       | Scales the card on the x, y, and z axes.<br><br>Setting one of these to a negative value reverses the input image along that axis.                                                                                                                                                                                                                                                                                                                                                                       |
| uniform scale  | uniform_scale    | 1             | Scales the frame simultaneously on x, y, and z. This effectively gangs the <b>scale xyz</b> values.                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew xyz       | skew             | 0, 0, 0       | Skews the card on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| pivot xyz      | pivot            | 0, 0, 0       | When you make changes to the card's position, scaling and rotation, these occur from the location of the card's origin point or pivot. The <b>pivot x, y</b> , and <b>z</b> controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the card. Subsequent local transformations will then occur relative to the new pivot point location.<br><br>You can also position the pivot point by pressing <b>Ctrl/Cmd+Alt</b> while dragging in the Viewer. |
| Local matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix    | useMatrix         | disabled      | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                        |
| matrix            | matrix            | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                              |
| geometry          |                   |               |                                                                                                                                                                                                                                                                                                                                    |
| lens-in focal     | lens_in_focal     | 1             | The focal length of the camera that took the picture on the card. The card is scaled to the correct size so that at distance <b>Z</b> , the card fills this field of view.                                                                                                                                                         |
| lens-in haperture | lens_in_haperture | 1             | The horizontal aperture of the camera that took the picture on the card. The card is scaled to the correct size so that at distance <b>Z</b> , the card fills this field of view.                                                                                                                                                  |
| render params     |                   |               |                                                                                                                                                                                                                                                                                                                                    |
| output format     | format            | root.format   | Select the format to which you want to output the sequence. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b> , resizes the image to the format indicated on the <b>Project Settings</b> dialog box.                                        |
| filter            | filter            | Cubic         | Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values). |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| clamp         | clamp            | disabled      | When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| motionblur     | motionblur       | 0             | <p>Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| shutter        | shutter          | 0.5           | <p>Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| shutter offset | shutteroffset    | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify.</li> </ul> |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                  |
|--------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame. |
|              | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                   |

# CornerPin2D

The CornerPin2D node is designed to map the four corners of an image sequence to or from positions derived from tracking data. In practice, this node lets you replace any four-cornered feature with another image sequence. You can use it to place an image in an on-screen television, for example.

Before using this node, you should use the Tracker node to generate four tracks, one per corner, on the feature requiring replacement.



**Note:** In order to populate the **to** and **from** fields with the right values, you need to create the CornerPin2D node with your input image selected in the Node Graph. If the CornerPin node is created as an unconnected node, the **to** and **from** fields use the root format values.

# Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                            |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>The image that will replace the feature tracked using the Tracker node.</p> <p>Note that the CornerPin2D node should NOT be connected to the Tracker node or the Tracker node's input image.</p> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CornerPin2D Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                       |
| to1 xy          | to1              | N/A           | Pin 1. This is the bottom left corner of the feature requiring replacement. You should link this control to the Tracker node's tracking data for the bottom left track. To do so, <b>Ctrl/Cmd</b> +drag the animation button next to the track in the Tracker node on top of the animation button here. You shouldn't adjust these values manually.   |
| enable1         | enable1          | enabled       | Enable or disable pin 1.                                                                                                                                                                                                                                                                                                                              |
| to2 xy          | to2              | N/A           | Pin 2. This is the bottom right corner of the feature requiring replacement. You should link this control to the Tracker node's tracking data for the bottom right track. To do so, <b>Ctrl/Cmd</b> +drag the animation button next to the track in the Tracker node on top of the animation button here. You shouldn't adjust these values manually. |
| enable2         | enable2          | enabled       | Enable or disable pin 2.                                                                                                                                                                                                                                                                                                                              |
| to3 xy          | to3              | N/A           | Pin 3. This is the top right corner of the feature requiring replacement. You should link this control to the Tracker node's tracking data for the top right track. To do so, <b>Ctrl/Cmd</b> +drag the animation button next to the track in the Tracker node on top                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | of the animation button here. You shouldn't adjust these values manually.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| enable3      | enable3          | enabled       | Enable or disable pin 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| to4 xy       | to4              | N/A           | Pin 4. This is the top left corner of the feature requiring replacement. You should link this control to the Tracker node's tracking data for the top left track. To do so, <b>Ctrl/Cmd</b> +drag the animation button next to the track in the Tracker node on top of the animation button here. You shouldn't adjust these values manually.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| enable4      | enable4          | enabled       | Enable or disable pin 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Copy 'from'  | copy_from_to     | N/A           | Click to copy and paste the <b>from1-4</b> values to the <b>to1-4</b> values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| extra matrix | transform_matrix | N/A           | Copy tracking information from a Roto/RotoPaint node to this matrix.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| invert       | invert           | disabled      | When enabled, the current <b>to</b> values are inverted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| filter       | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative - y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>negative -y portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| clamp         | clamp            | disabled      | <p>When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b>, you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <p><b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present.</p> </div>                                                                                            |
| motionblur    | motionblur       | 0             | <p>Sets the number of motion blur samples. A value of 1 should produce reasonable results for most</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                     |               | <p>sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter        | shutter             | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| shutter offset | shutteroffset       | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                                                                                                                                                                                                 |
| From Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                |
| from1 xy     | from1            | N/A           | This value is identical to the original <b>to1</b> value (bottom left), and you can change this value manually to adjust the corner pin result. You can, for example, make your result bigger than the original tracked polygon area by giving your corners new xy values, or reposition the corners to get a mirrored image.  |
| from2 xy     | from2            | N/A           | This value is identical to the original <b>to2</b> value (bottom right), and you can change this value manually to adjust the corner pin result. You can, for example, make your result bigger than the original tracked polygon area by giving your corners new xy values, or reposition the corners to get a mirrored image. |
| from3 xy     | from3            | N/A           | This value is identical to the original <b>to3</b> value (top right), and you can change this value manually to adjust the corner pin result. You can, for example, make your result bigger than the original tracked polygon area by giving your corners new xy values, or reposition the corners to get a mirrored image.    |
| from4 xy     | from4            | N/A           | This value is identical to the original <b>to4</b> value (top left), and you can change this value manually to adjust the corner pin result. You can, for example, make your result bigger than the original tracked polygon area by giving your corners new xy values, or reposition the corners to get a mirrored image.     |
| Set to input | set_to_input     | N/A           | Click to set the <b>from</b> values to the input format.                                                                                                                                                                                                                                                                       |
| Copy 'to'    | copy_from_to     | N/A           | Click to copy and paste the <b>to1-4</b> values to the <b>from1-4</b> values.                                                                                                                                                                                                                                                  |

# Crop

The Crop node lets you cut out the unwanted portions of the image area. You can fill the cropped portion with black or adjust the image output format to match the cropped image.

## Inputs and Controls

| Connection Type | Connection Name | Function                    |
|-----------------|-----------------|-----------------------------|
| Input           | unnamed         | The image sequence to crop. |

| Control (UI)                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Crop Tab                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| box x, y, r, t<br>(or x, y, w, h) | box              | N/A           | <p>The area of the input image you want to keep. Anything outside this box is cropped.</p> <p>You can adjust the following:</p> <ul style="list-style-type: none"> <li>• <b>x</b> - the distance (in pixels) between the left edge of the original image and the left side of the crop box.</li> <li>• <b>y</b> - the distance (in pixels) between the bottom edge of the original image and the bottom edge of the crop box.</li> <li>• <b>r</b> - the distance (in pixels) between the left edge of the original image and the right side of the crop box.</li> <li>• <b>t</b> - the distance (in pixels) between the bottom edge of the original image and the top edge of the crop box.</li> <li>• <b>w</b> - the width of the crop box. This is only available if you click the <b>wh</b> button.</li> <li>• <b>h</b> - the height of the crop box. This is only available if you click the <b>wh</b> button.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                  |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | You can also adjust the crop box in the Viewer by dragging its edges.                                                                                                                                                                                                                                                                                     |
| softness      | softness         | 0             | <p>Allows you to vignette the edges of the cropped portion. The larger the value, the more of the area around the edges is faded to black.</p> <p>A value of 0 produces no vignetting.</p>                                                                                                                                                                |
| reformat      | reformat         | disabled      | <p>When enabled, the image output format is changed to match the cropped image.</p> <p>When disabled, the original image output format is used.</p>                                                                                                                                                                                                       |
| intersect     | intersect        | disabled      | <p>When enabled, the output bounding box is an intersection of the crop bounding box and the incoming bounding box.</p> <p>When disabled, the output bounding box matches the crop bounding box and can extend outside the incoming bounding box.</p>                                                                                                     |
| black outside | crop             | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake,</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div> |

# GridWarp

The GridWarp node allows you to warp images by transferring image information from one Bezier grid onto another. When using this node, you first position the source grid, which defines where to warp from. Next, you position the destination grid, which defines where to warp the image to. This grid can be a duplicate of the source grid, or you can define it separately. When you manipulate the destination grid, the corresponding warp is applied to the source image.

See also [SplineWarp](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                            |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | bg              | The background image to receive the warp result when the <b>background</b> control is set to <b>bg</b> .                                                                                                                                                            |
|                 | dst             | The destination image to warp to.                                                                                                                                                                                                                                   |
|                 | src             | The source image to warp from.                                                                                                                                                                                                                                      |
|                 | mask            | <p>An optional image to use as a mask. By default, the warp effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GridWarp Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| channels     | channels         | all           | <p>The warp effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the warp is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel so that the warp is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| fringe       | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Source Grid  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| keys         | source_grid_keys | 0, 0          | <p>Controls keyframes applied to the Source Grid:</p> <ul style="list-style-type: none"> <li>• <b>keys</b> - displays the current and total number of keyframes.</li> <li>•  - browse to the previous and next keyframe.</li> <li>•  - add or remove a keyframe on the current frame.</li> <li>•  - copy a keyframe to the clipboard.</li> </ul> |

| Control (UI)     | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                       |               | <ul style="list-style-type: none"> <li> - paste a keyframe from the clipboard.</li> </ul> <div>  <b>Note:</b> If Viewer tools <b>auto</b> is enabled, any changes to the grid are automatically set as keyframes at the current frame.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| visible          | source_grid_visible   | disabled      | When enabled, the Source Grid lines and handles are visible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| locked           | source_grid_locked    | disabled      | When enabled, the Source Grid lines and handles are locked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Resize to Image  | source_image_size     | N/A           | Click to resize the <b>Source Grid</b> to the same size as the <b>src</b> input image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Destination Grid |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| keys             | destination_grid_keys | 0, 0          | <p>Controls keyframes applied to the Destination Grid:</p> <ul style="list-style-type: none"> <li><b>keys</b> - displays the current and total number of keyframes.</li> <li> - browse to the previous and next keyframe.</li> <li> - add or remove a keyframe on the current frame.</li> <li> - copy a keyframe to a temporary buffer.</li> <li> - paste a keyframe from the temporary buffer.</li> </ul> <div>  <b>Note:</b> If Viewer tools <b>auto</b> is enabled, any changes to the grid are automatically set as keyframes at the current frame.         </div> |
| visible          | destination_grid_     | enabled       | When enabled, the Destination Grid lines and handles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)    | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | visible                 |               | are visible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| locked          | destination_grid_locked | disabled      | When enabled, the Destination Grid lines and handles are locked.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Resize to Image | destination_image_size  | N/A           | Click to resize the <b>Destination Grid</b> to the same size as the <b>dst</b> input image.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Settings        |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| output          | output                  | source warped | <p>Controls what output is displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>source</b> - the source image and source grid.</li> <li>• <b>sourcewarped</b> - the source image and destination grid.</li> <li>• <b>destination</b> - the destination image and destination grid.</li> <li>• <b>destinationwarped</b> - the destination image and source grid.</li> <li>• <b>morph</b> - the morphed image, controlled by the <b>warp</b> and <b>mix</b> parameters, and both grids.</li> </ul> |
| warp            | warp                    | 1             | <p>Controls grid distortion during morphing. The <b>mix</b> value controls whether the source or destination grids are affected.</p> <div>  <b>Note:</b> Warp is only enabled when the output control is set to <b>morph</b>.         </div>                                                                                                                                                                                      |
| mix             | mix                     | 0             | <p>Dissolves between the source image (at 0) and the destination image (at 1).</p> <div>  <b>Note:</b> Mix is only enabled when the output control is set to <b>morph</b>.         </div>                                                                                                                                                                                                                                         |
| background      | background              | on src        | <p>Sets what to use as the warp background:</p> <ul style="list-style-type: none"> <li>• <b>on black</b> - render the warped image on top of a</li> </ul>                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)   | Knob (Scripting)                    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|-------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                     |               | <p>constant black image.</p> <ul style="list-style-type: none"> <li>• <b>on src</b> - render the warped image on top of the image connected to the <b>src</b> input of the GridWarp node.</li> <li>• <b>on dst</b> - render the warped image on top of the image connected to the <b>dst</b> input of the GridWarp node.</li> <li>• <b>on bg</b> - render the warped image on top of a background image connected to the <b>bg</b> input of the GridWarp node.</li> </ul> |
| background mix | background_mix                      | 0             | Blends between the output of the GridWarp node (at 0) and whatever you have selected from the background dropdown menu (at 1).                                                                                                                                                                                                                                                                                                                                            |
| set bbox to    | boundary_box                        | union         | <p>Sets the boundary box properties.</p> <ul style="list-style-type: none"> <li>• <b>union</b> - both input boundary boxes are combined.</li> <li>• <b>format</b> - the input with the largest boundary box is used.</li> </ul>                                                                                                                                                                                                                                           |
| Transform Tab  |                                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Source         |                                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| translate xy   | source_grid_<br>transform_translate | 0, 0          | <p>Translates the selected grid(s) on the x and y axes.</p> <p>Alternatively, you can drag on an axis on the transformation overlay in the Viewer.</p>                                                                                                                                                                                                                                                                                                                    |
| rotate         | source_grid_<br>transform_rotate    | 0             | <p>Rotates the selected grid(s) around the <b>center xy</b> coordinates.</p> <p>Alternatively, you drag the transformation overlay in the Viewer.</p>                                                                                                                                                                                                                                                                                                                     |
| scale          | source_grid_<br>transform_scale     | 1             | <p>Scales the selected grid(s) width and height.</p> <p>Setting one of these to a negative value reverses the selected grid(s) along that axis.</p>                                                                                                                                                                                                                                                                                                                       |



| Control (UI)         | Knob (Scripting)                     | Default Value             | Function                                                                                                                                                                             |
|----------------------|--------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew X               | source_grid_transform_skewX          | 0                         | Skews the selected grid(s) on the x axis.                                                                                                                                            |
| skew Y               | source_grid_transform_skewY          | 0                         | Skews the selected grid(s) on the y axis.                                                                                                                                            |
| skew order           | source_grid_transform_skew_order     | XY                        | Sets the order in which skew transforms are applied to the source grid: <ul style="list-style-type: none"> <li>• XY</li> <li>• YX</li> </ul>                                         |
| center xy            | source_grid_transform_center         | Dependent on source input | Sets the center of scaling and rotation for the selected grid(s).                                                                                                                    |
| extra matrix         | source_grid_transform_matrix         | N/A                       | Copy tracking information from either a Tracker or Roto/RotoPaint node to this matrix.<br><br>Warps linked in this way follow the information from the imported track automatically. |
| Destination          |                                      |                           |                                                                                                                                                                                      |
| use source transform | use_source_transform                 | enabled                   | When enabled, the source and destination grids are translated identically.<br><br>Disable this control if you want to translate the destination image independently.                 |
| transform xy         | destination_grid_transform_translate | 0, 0                      | Translates the destination grid on the x and y axes.<br><br>Alternatively, you can drag on an axis on the transformation overlay in the Viewer.                                      |
| rotate               | destination_grid_transform_rotate    | 0                         | Rotates the destination grid around the <b>center xy</b> .<br><br>Alternatively, you drag the transformation overlay in the Viewer.                                                  |
| scale                | destination_grid_transform_scale     | 1                         | Scales the destination grid width and height.<br><br>Setting one of these to a negative value reverses the                                                                           |

| Control (UI)       | Knob (Scripting)                      | Default Value                  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|---------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                       |                                | input image along that axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| skew X             | destination_grid_transform_skewX      | 0                              | Skews the selected grid(s) on the x axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| skew Y             | destination_grid_transform_skewY      | 0                              | Skews the selected grid(s) on the y axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| skew order         | destination_grid_transform_skew_order | XY                             | Sets the order in which skew transforms are applied to the destination grid: <ul style="list-style-type: none"> <li>• XY</li> <li>• YX</li> </ul>                                                                                                                                                                                                                                                                                                                                                                      |
| center xy          | destination_grid_transform_center     | Dependent on destination input | Sets the center of scaling and rotation for the destination grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| extra matrix       | destination_grid_transform_matrix     | N/A                            | Copy tracking information from either a Tracker or Roto/RotoPaint node to this matrix.<br><br>Warpes linked in this way follow the information from the imported track automatically.                                                                                                                                                                                                                                                                                                                                  |
| Render Tab         |                                       |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| submesh resolution | render_res                            | 10                             | Sets the number of subdivisions created between bezier curves in the grid during rendering.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| filter             | filter                                | cubic                          | Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values). <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> </ul> |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | <ul style="list-style-type: none"> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| Options Tab       |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Colors            |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| source color      | source_color      | N/A           | Sets the color of the source grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| destination color | destination_color | N/A           | Sets the color of the destination grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

# GridWarpTracker

GridWarpTracker is an alternate solution to manual tracking with PlanarTracker, which allows you to warp and morph using custom grid shapes driven by tracking data, rather than being constrained to rigid transformations. If you have a NukeX or Nuke Studio license, you can also use SmartVectors to drive the grids.

The **From** and **To** grids allow you to add and copy tracking data between grids so that you can make adjustments without losing your original data and without having to create a backup version of the node. If you have a NukeX or Nuke Studio license, you can add keyframed adjustment grids to modify your **From** and **To** grid shapes without altering the original grid data.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                          |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------|
| Input           | src             | The sequence you want to warp or morph.                                                                           |
|                 | dst             | An optional input to which the <b>src</b> image is morphed using the <b>Morph Amount</b> and <b>Mix</b> controls. |
|                 | SmartVector     | An optional input allowing you to drive the warp or morph using NukeX's SmartVector node.                         |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                             |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GridWarpTracker Tab |                  |               |                                                                                                                                                                                                      |
| channels            | channels         | all           | The warp effect is only applied to these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| mask                | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                        |
|                     | maskChannelInput | none          | The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel.                                                                                       |
| inject              | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream.                                                         |
| invert              | invert_mask      | disabled      | Inverts the use of the mask channel so that the filter                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | effect is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                             |
| fringe       | fringe           | disabled      | <p>When enabled, only apply the effect to the edge of the mask.</p> <p>When disabled, the effect is applied to the entire mask.</p>                                                                                                                                                                                                               |
| Mode         |                  |               |                                                                                                                                                                                                                                                                                                                                                   |
| Output       | output           | Warp          | <p>Sets the output displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Warp</b> - displays the warped <b>src</b> input from the points in the <b>From</b> grid to the points in the <b>To</b> grid.</li> <li>• <b>Morph</b> - displays both grids and the morphed image depending on the warp and mix parameters.</li> </ul> |
| Invert       | invert_warp      | disabled      | When enabled, swap the From and To grids so that the warped destination is displayed, rather than the warped source.                                                                                                                                                                                                                              |
| Warp Amount  | warp             | 1             | When <b>Output</b> is set to <b>Warp</b> , controls the amount of warp between the <b>From</b> and <b>To</b> grids, where <b>1</b> is the full warp and <b>0</b> is the source image.                                                                                                                                                             |
| Morph Amount | morph            | 1             | When <b>Output</b> is set to <b>Morph</b> , controls the strength of morphing between the <b>From</b> and <b>To</b> grids, where <b>1</b> is the full morph and <b>0</b> is the source image.                                                                                                                                                     |
| Mix          | mix              | 0             | When <b>Output</b> is set to <b>Morph</b> , adjusts the mix between the source and destination images, where 0 is the source image and 1 is the destination image.                                                                                                                                                                                |
| Set BBox To  | bbox             | Union         | Select how you want to output the bounding box. The default is <b>Union</b> , which combines the two bounding boxes. You can also select <b>Format</b> to set the bounding box to the format size.                                                                                                                                                |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Background                                                                          | background       | Black         | If your grids are smaller than the format size, sets whether the warp or morph is rendered against a <b>Black</b> constant or the <b>Source</b> image.                                                                                                                                                                                                  |
| Grids                                                                               |                  |               |                                                                                                                                                                                                                                                                                                                                                         |
| Divisions XY                                                                        | divisions_x      | 5             | Controls the number of columns in the grids. Accepts values from 3 to 20                                                                                                                                                                                                                                                                                |
|                                                                                     | divisions_y      | 5             | Controls the number of rows in the grids. Accepts values from 3 to 20                                                                                                                                                                                                                                                                                   |
| Gang                                                                                | divisions_gang   |               | When enabled, changes to either of the divisions sliders is applied to both axes.                                                                                                                                                                                                                                                                       |
| Keys                                                                                | N/A              | 0             | Displays the total number of user keyframes added to the sequence.                                                                                                                                                                                                                                                                                      |
|                                                                                     | N/A              | 0             | Displays the current user keyframe.                                                                                                                                                                                                                                                                                                                     |
|   | N/A              | N/A           | Click to jump to the previous user keyframe.                                                                                                                                                                                                                                                                                                            |
|  | N/A              | N/A           | Click to jump to the next user keyframe.                                                                                                                                                                                                                                                                                                                |
|  | N/A              | N/A           | Click to add a user keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                      |
|  | N/A              | N/A           | Click to delete the user keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                 |
|  | N/A              | N/A           | Click to copy the current keyframe to the clipboard.                                                                                                                                                                                                                                                                                                    |
|  | N/A              | N/A           | Click to copy all keyframes to the clipboard.                                                                                                                                                                                                                                                                                                           |
|  | N/A              | N/A           | Click to paste keyframes from the clipboard.                                                                                                                                                                                                                                                                                                            |
| From                                                                                | N/A              | N/A           | <p>Displays the state of the From grid where the warp or morph operation begins.</p> <ul style="list-style-type: none"> <li> - click to link or unlink the <b>From</b> and <b>To</b> grids. When linked, changes to either grid are applied to the other.</li> </ul> |

| Control (UI)  | Knob (Scripting)                  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|-----------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                   |               | <ul style="list-style-type: none"> <li>•  - click to make the selected grid active.</li> <li>•  - click to hide the selected grid.</li> <li>•  - click to lock the selected grid. Vertices on a locked grid cannot be adjusted.</li> <li>•  - click to change the color of the selected grid.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| To            | N/A                               | N/A           | <p>Displays the state of the To grid where the warp or morph operation ends. Also displays the state of any adjustment grids, if present.</p> <ul style="list-style-type: none"> <li>•  - click to link or unlink the <b>From</b> and <b>To</b> grids. When linked, changes to either grid are applied to the other. Adjustment grids cannot be linked to other grids.</li> <li>•  - click to make the selected grid active.</li> <li>•  - click to hide the selected grid.</li> <li>•  - click to lock the selected grid. Vertices on a locked grid cannot be adjusted.</li> <li>•  - click to change the color of the selected grid.</li> </ul> <div>  <b>Note:</b> GridWarpTracker can process a maximum of six adjustment grids.         </div> |
| Transform Tab |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| From          |                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Translate xy  | from_base_<br>transform_translate | 0,0           | Adjusts the translation, rotation, and scale values applied to the base grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rotate        | from_base_<br>transform_rotate    | 0             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)       | Knob (Scripting)                       | Default Value                                                                                   | Function                                                                                                                                                                                                                                                                                            |
|--------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale              | from_base_<br>transform_scale          | 1                                                                                               |                                                                                                                                                                                                                                                                                                     |
| Skew X             | from_base_<br>transform_skewX          | 0                                                                                               | Adjusts the skew applied to the base grid on the X and Y axes.                                                                                                                                                                                                                                      |
| Skew Y             | from_base_<br>transform_skewY          | 0                                                                                               |                                                                                                                                                                                                                                                                                                     |
| Skew Order         | from_base_<br>transform_skew_<br>order | XY                                                                                              | <p>Sets the order in which skew transforms are applied:</p> <p><b>XY</b></p> <p><b>YX</b></p>                                                                                                                                                                                                       |
| Center xy          | from_base_<br>transform_center         | dependent on<br>input format<br>or<br>Compositing<br>environment<br><b>Project<br/>Settings</b> | <p>Sets the center of rotation and scaling. You can also <b>cmd</b> + drag the <b>Transform</b> widget in the Viewer.</p> <p>This control defaults to the center of the input format or the <b>Project Settings</b> &gt; <b>full size format</b> control if no input is connected.</p>              |
| Extra Matrix       | from_base_<br>transform_matrix         | N/A                                                                                             | <p>Adds an extra matrix which is calculated after the transforms defined by the other controls.</p> <p>This can be useful, for example, if you are using a 3rd party application, such as a tracker, and your tracking data cannot be fully represented using the available transform controls.</p> |
| To                 |                                        |                                                                                                 |                                                                                                                                                                                                                                                                                                     |
| Use From Transform | use-source_<br>transform               | enabled                                                                                         | <p>When enabled, the transforms applied to the <b>From</b> grid are mirrored on the <b>To</b> grid.</p> <p>When disabled, you can apply transforms to the <b>To</b> grid independent of the <b>From</b> grid.</p>                                                                                   |
| Translate xy       | to_base_transform_                     | 0,0                                                                                             | Adjusts the translation, rotation, and scale values                                                                                                                                                                                                                                                 |



| Control (UI) | Knob (Scripting)             | Default Value                                                                   | Function                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | translate                    |                                                                                 | applied to the base grid, providing <b>Use From Translation</b> is disabled.                                                                                                                                                                                                                                                                           |
| Rotate       | to_base_transform_rotate     | 0                                                                               |                                                                                                                                                                                                                                                                                                                                                        |
| Scale        | to_base_transform_scale      | 1                                                                               |                                                                                                                                                                                                                                                                                                                                                        |
| Skew X       | to_base_transform_skewX      | 0                                                                               | Adjusts the skew applied to the base grid on the X and Y axes, providing <b>Use From Translation</b> is disabled.                                                                                                                                                                                                                                      |
| Skew Y       | to_base_transform_skewY      | 0                                                                               |                                                                                                                                                                                                                                                                                                                                                        |
| Skew Order   | to_base_transform_skew_order | XY                                                                              | <p>Sets the order in which skew transforms are applied, providing <b>Use From Translation</b> is disabled:</p> <p><b>XY</b></p> <p><b>YX</b></p>                                                                                                                                                                                                       |
| Center xy    | to_base_transform_center     | dependent on input format or Compositing environment<br><b>Project Settings</b> | <p>Sets the center of rotation and scaling, providing <b>Use From Translation</b> is disabled. You can also <b>cmd + drag</b> the <b>Transform</b> widget in the Viewer.</p> <p>This control defaults to the center of the input format or the <b>ProjectSettings &gt; full size format</b> control if no input is connected.</p>                      |
| Extra Matrix | to_base_transform_matrix     |                                                                                 | <p>Adds an extra matrix which is calculated after the transforms defined by the other controls, providing <b>Use From Translation</b> is disabled.</p> <p>This can be useful, for example, if you are using a 3rd party application, such as a tracker, and your tracking data cannot be fully represented using the available transform controls.</p> |
| Render Tab   |                              |                                                                                 |                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Submesh Resolution | render_res       | 10            | Sets the number of subdivisions that are created between bezier curves in the grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Filter             | filter           | Cubic         | <p>Sets the image resampling filter to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |

Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.)

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|-------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| before render     | beforeRender      | none          | These functions run prior to starting rendering in <b>execute()</b> . If they throw an exception, the render aborts.                                 |
| before each frame | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame  | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render      | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress   | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# IDistort

IDistort warps the input image based on the values in the image's **UV channels**. The U and V values are offsets for where a pixel will come from. For example, if pixel 51, 23 has a U and V value of -1, 5, the pixel's value will come from 50, 28 of the input channels.

You can use the Copy node to merge the two distortion channels in with your image channels, and then select the two channels from the **UV channels** dropdown menu.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                          |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | This input needs to include both the channels to distort and the two channels to use to calculate the distortion. |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | mask            | <p>An optional image to use as a mask. By default, the distortion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IDistort Tab |                  |               |                                                                                                                                                                                                                                                                                                                   |
| channels     | channels         | all           | <p>The distortion is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                         |
| UV channels  | uv               | none          | <p>The two channels that are used to calculate the distortion for the input image. The U and V values are offsets for where a pixel will come from. For example, if pixel 51, 23 in the above input channels has a U and V value of -1, 5, the pixel's new value will come from 50, 28 of the input channels.</p> |
| UV offset    | uv_offset        | 0             | <p>This is subtracted from the <b>UV channels</b> to set a non-zero center point for renderers that cannot output negative numbers.</p>                                                                                                                                                                           |
| UV scale     | uv_scale         | 1             | <p>Multiply the <b>UV channels</b> by this value.</p>                                                                                                                                                                                                                                                             |
| blur channel | N/A              | disabled      | <p>Enable the associated blur channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p>                                                                                                                                                                                |
|              | blur             | none          | <p>Values in this channel are added to the size of the sample area to add extra blur or diffusion to the distortion.</p>                                                                                                                                                                                          |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| blur scale    | blur_scale       | 1             | Adjusts the amount of blur.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| mask channel  | N/A              | disabled      | Enable the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|               | maskChannel      | none          | The channel to use as a mask. By default, the distortion is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| invert        | invert_mask      | disabled      | Inverts the mask so that the distortion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| premultiplied | premultiplied    | disabled      | Check this if the <b>UV</b> and <b>blurchannels</b> have been premultiplied by the alpha channel, such as when output by a renderer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| filter        | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |

# LensDistortion

The LensDistortion node (NukeX and Nuke Studio only) estimates the lens distortion in a given image, either through Grid Detection or manual Line Detection. The warp can then be used to add or remove distortion or produce an STMap in the **motion** channel for use elsewhere.



**Note:** You must perform the analysis in NukeX or Nuke Studio, but you can use the results in Nuke.

## Inputs and Controls

| Connection Type | Connection Name | Function                    |
|-----------------|-----------------|-----------------------------|
| Input           | Source          | The image sequence to warp. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                  |
|--------------------|------------------|---------------|---------------------------|
| LensDistortion Tab |                  |               |                           |
| Local GPU          | gpuName          | N/A           | Displays the GPU used for |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p>rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <p><b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.</p> </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI) | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                       |               | <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Model Preset | distortionModelPreset | NukeX Classic | <p>Sets the distortion model to use and adds or removes <b>Distortion Parameter</b> controls depending on the preset selected:</p> <ul style="list-style-type: none"> <li>• <b>NukeX Classic</b> - uses the distortion model from legacy versions of Nuke.</li> <li>• <b>CaraVR Radial, Degree 3</b> - uses a distortion model suitable for CaraVR.</li> <li>• <b>3DEqualizer</b> - provides</li> </ul>                                                                                                     |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>several distortion models suitable for 3DE.</p> <ul style="list-style-type: none"> <li>• <b>Custom</b> - allows you to customize the distortion model from scratch.</li> </ul> |
| Lens Type    | lens             | Spherical     | <p>Sets the lens type used to shoot the sequence:</p> <ul style="list-style-type: none"> <li>• <b>Spherical</b></li> <li>• <b>Anamorphic</b></li> </ul>                           |

Anamorphic Parameters - These controls are only displayed when the **Lens Type** control is set to **Anamorphic**.

|           |                   |     |                                                                                                             |
|-----------|-------------------|-----|-------------------------------------------------------------------------------------------------------------|
| Squeeze   | anamorphicSqueeze | 1   | Sets the anamorphic squeeze used to rescale the <b>x</b> coefficients in the <b>Distortion Parameters</b> . |
| Twist     | anamorphicTwist   | 0   | Compensates for lens twist, measured in degrees.                                                            |
| Scale x,y | anamorphicScale   | 1,1 | Compensates for lens breathing, the slight changes in focal length when changing the focus.                 |

Distortion Parameters - these controls are dependent on the distortion **Model Preset** applied.

|               |                        |     |                                                                                               |
|---------------|------------------------|-----|-----------------------------------------------------------------------------------------------|
| Denominator s | distortionDenominator0 | 0   | Sets the denominator coefficients for the symmetric coefficients (s) of the distortion model. |
|               | distortionDenominator1 | 0   | These controls are linked to the controls of the same name on the <b>Advanced</b> tab.        |
| Centre        | centre                 | 0,0 | Sets the position of the                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | distortion center.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Output       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Mode         | output           | Undistort     | <p>Sets the type of output from the node:</p> <ul style="list-style-type: none"> <li>• <b>STMap</b> - renders both undistortion and redistortion STMaps in the <b>motion</b> channels. Use the <b>forward</b> channels for undistorting and the <b>backward</b> channels for redistorting. The other input channels are copied to the output directly. In this mode, the overlay grids can be displayed on top of the source image.</li> <li>• <b>Undistort</b> - undistorts the input directly in the Viewer, allowing to visualize the undistorted overlay grid.</li> <li>• <b>Redistort</b> - redistorts the input directly in the Viewer, allowing to visualize the redistorted overlay grid.</li> </ul> |
| Use Fisheye  | useFisheye       | enabled       | <p>When enabled, lens projection is considered as part of the distortion when warping fisheye lenses.</p> <p>When disabled, Nuke renders an 'ideal' fisheye</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>without distortion when undistorting, and applies distortion to a fisheye image when redistorting.</p> <div>  <b>Note:</b> This control has no effect on <b>Rectilinear</b> lenses. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Filter       | filter           | Cubic         | <p>When <b>Mode</b> is set to <b>Undistort</b> or <b>Redistort</b>, sets the image resampling filter to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased or jaggy edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>(as shown by the negative -y portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| BBox         | bboxType         | Auto          | <p>Sets how the bounding box is calculated:</p> <ul style="list-style-type: none"> <li>• <b>Auto</b> - the bounding box is set automatically, which can lead to a performance hit if the bounds are much larger than the image.</li> <li>• <b>Input</b> - the bounding box is set to the same</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)       | Knob (Scripting)      | Default Value                                                   | Function                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                       |                                                                 | <p>dimensions as the input image.</p> <ul style="list-style-type: none"> <li>• <b>Manual</b> - allows you to set the bounding manually using the outputBBBox controls.</li> </ul>                                                                                                                                    |
|                    | outputBBBox           | dependent on Compositing environment<br><b>Project Settings</b> | <p>When <b>BBBox</b> is set to <b>Manual</b>, adjust the BBox by entering values in the <b>x</b>, <b>y</b>, <b>r</b>, and <b>t</b> controls.</p> <p>You can also use the crop widget in the Viewer to adjust the BBox.</p>                                                                                           |
| Output Format      | outputFormatType      | Input                                                           | <p>Sets the output format:</p> <ul style="list-style-type: none"> <li>• <b>Input</b> - the output format is the same as the input format.</li> <li>• <b>Format</b> - the output format is controlled by the format dropdown.</li> <li>• <b>BBBox</b> - the output format is the same as the bounding box.</li> </ul> |
|                    | format                | dependent on Compositing environment<br><b>Project Settings</b> | <p>Sets the output format to use when <b>Output Format</b> is set to <b>Format</b>.</p>                                                                                                                                                                                                                              |
| Distortion Scaling | distortionScalingType | Scale to Input Format                                           | <p>Sets the rescaling mode:</p> <ul style="list-style-type: none"> <li>• <b>Scale to Input Format</b> - use the input format to scale the distortion in the</li> </ul>                                                                                                                                               |

| Control (UI) | Knob (Scripting)   | Default Value                                                   | Function                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|--------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                    |                                                                 | output.<br><ul style="list-style-type: none"> <li>• <b>Format</b> - use the selected format to scale the output.</li> </ul>                                                                                                                                                                                                                                                                         |
|              | outputFormat       | dependent on Compositing environment<br><b>Project Settings</b> | Sets the format to use to reformat the image when <b>Distortion Scaling</b> is set to <b>Format</b> .                                                                                                                                                                                                                                                                                               |
| Analysis Tab |                    |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
| Grid Detect  |                    |                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
| Detect       | detect             | N/A                                                             | Click to run the selected detection method on all key frames for a calibration grid shot.<br><br>Grid detection consists of feature detection and feature linking. It can be run in one step, using <b>Grids</b> detection, or broken down into two steps to allow for manual corrections.<br><br>See the <b>Grid Detection</b> controls for more information on changing the detection parameters. |
| N/A          | detectionFrameType | Current Frame                                                   | Sets the number of frames processed by the <b>Detect</b> button:<br><ul style="list-style-type: none"> <li>• <b>Current Frame</b> - only detect grids on the current frame.</li> </ul>                                                                                                                                                                                                              |

| Control (UI)       | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                             |
|--------------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                   |               | <ul style="list-style-type: none"> <li>• <b>Every N Frames</b> - detect grids on the current frame and every N frames after that. N is specified by the control to the right. The default value of N is <b>5</b> frames.</li> </ul>                                                  |
| Preview            | preview           | disabled      | <p>You can enable the <b>Preview</b> control to view the features that the LensDistortion node is likely to find when you click the <b>Detect</b> button.</p> <p>You can adjust the controls in the <b>Settings</b> dropdown to improve the result and then click <b>Detect</b>.</p> |
| Settings           |                   |               |                                                                                                                                                                                                                                                                                      |
| Number of Features | numFeatures       | 5000          | <p>Sets the maximum number of detected features.</p> <p>You can try increasing the <b>Number of Features</b> if the grid is not fully covered by feature points.</p>                                                                                                                 |
| Patch Size         | patchSize         | 9             | <p>Sets the patch size for feature relocalization.</p> <p>Try increasing the <b>Patch Size</b> if features are not consistently located on saddle points.</p>                                                                                                                        |
| Feature Separation | featureSeparation | 15            | Sets the distribution of features in relation to each                                                                                                                                                                                                                                |

| Control (UI)        | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|---------------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                    |               | <p>other.</p> <p>This value should reflect the scale of a square element of the grid.</p>                                                                                                                                                                                                                                  |
| Detection Threshold | detectionThreshold | 100           | <p>Sets the detection threshold at which features are rejected automatically.</p> <p>You can increase the value to reject weaker features, such as points not on a grid.</p>                                                                                                                                               |
| Feature Linking     |                    |               |                                                                                                                                                                                                                                                                                                                            |
| Angle Threshold     | angleThreshold     | 8             | <p>Sets the angle tolerance when linking neighboring features.</p> <p>If you find there are too many missing links between adjacent features, try increasing this value.</p> <p>High values can introduce ambiguity in the linking process, so adjust the <b>Angle Threshold</b> to get the best coverage of the grid.</p> |
| Distance Threshold  | distanceThreshold  | 30            | <p>Sets the distance tolerance allowed when merging neighboring links.</p> <p>You can increase the <b>Distance Threshold</b> to recover missing feature points after detection.</p>                                                                                                                                        |



| Control (UI)                                                                        | Knob (Scripting)              | Default Value | Function                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|-------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peak Threshold                                                                      | peakThreshold                 | 20            | <p>Sets the peak tolerance when detecting linking directions.</p> <p>You can decrease the <b>Peak Threshold</b> to improve feature linking if the grid image does not contain a sufficient contrast.</p> |
| Editing and Drawing                                                                 |                               |               |                                                                                                                                                                                                          |
|    | lineDrawingModeSelectAll      | N/A           | Click to enable the generic selection tool.                                                                                                                                                              |
|    | lineDrawingModeSelectFeatures | N/A           | Click to enable the feature selection tool.                                                                                                                                                              |
|   | lineDrawingModeSelectLines    | N/A           | Click to enable the line selection tool.                                                                                                                                                                 |
|  | lineDrawingModeAddFeatures    | N/A           | Click to enable the add feature tool.                                                                                                                                                                    |
|  | lineDrawingModeRemoveFeatures | N/A           | Click to enable the remove feature tool.                                                                                                                                                                 |
|  | lineDrawingModeAddLines       | N/A           | Click to enable the line drawing tool.                                                                                                                                                                   |
| Solve                                                                               |                               |               |                                                                                                                                                                                                          |
| Keys                                                                                | N/A                           | 1             | Displays the current keyframe number.                                                                                                                                                                    |
|                                                                                     | N/A                           | 1             | Displays the total number of keyframes.                                                                                                                                                                  |
|  | N/A                           | N/A           | Click to jump to the previous keyframe.                                                                                                                                                                  |
|  | N/A                           | N/A           | Click to jump to the next key                                                                                                                                                                            |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|  | N/A              | N/A           | Click to add a keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | N/A              | N/A           | Click to delete the keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|  | N/A              | N/A           | Click to delete all keyframes in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Solve                                                                             | solveDistortion  | N/A           | <p>Click to estimate the distortion model parameters using the detected grids.</p> <p>The solver attempts to warp the distorted links into straight lines.</p> <div>  <p><b>Note:</b> Solving the distortion model requires at least as many feature links as parameters in the distortion model. If the Detect method doesn't find enough links, try adding more keyframes or tuning the detection parameters.</p> </div> |
| Reject                                                                            | deleteOutliers   | N/A           | Click to reject links for which                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>the residual error is outside the error <b>Threshold</b>.</p> <p>You can delete outliers drawn red in the overlay and then click <b>Solve</b> again to improve the results by refining the warp.</p> <p>You can also delete links manually by selecting them and pressing the <b>Delete</b> or <b>Backspace</b> keyboard shortcuts. Holding <b>Ctrl/Cmd</b> while deleting links keeps only the selected links.</p> |
| Reset        | resetDistortion  |               | Resets the distortion parameters and solve state. Deleted features and links are not restored.                                                                                                                                                                                                                                                                                                                         |
| Solve Error  | solveError       | 0             | <p>Displays the root mean square (RMS) solve error in pixels.</p> <p>This can be used to measure the quality of the solve. It is computed as the average deviation to an ideal straight line for each link. Move the mouse over a link to display its individual residual error.</p>                                                                                                                                   |
| Threshold    | errorThreshold   | 10            | <p>Sets the error threshold for outliers rejection.</p> <p>Lower values can produce a closer fit, but with the risk of</p>                                                                                                                                                                                                                                                                                             |

| Control (UI)     | Knob (Scripting) | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |                    | overfitting. Too many outliers can be an indication of an issue with the selected distortion model.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Overlay          |                  |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Show             | overlayType      | All                | <p>Selects what to display in the overlay:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - disables the overlay.</li> <li>• <b>Features</b> - only displays detected feature points. Only features are editable in this mode. Deleting a feature does not delete any associated links.</li> <li>• <b>Links</b> - only display the links between feature points. Only links are editable in this mode. Deleting a link does not delete the features it connects.</li> <li>• <b>All</b> - displays both feature points and links. When this option is selected, both types can be edited at the same time.</li> </ul> |
| Advanced Tab     |                  |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Fisheye          |                  |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Projection Model | projection       | None (Rectilinear) | Sets the projection type, either <b>None (Rectilinear)</b> or <b>Fisheye</b> . <b>Fisheye</b> offers several sub-types:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)    | Knob (Scripting)      | Default Value   | Function                                                                                                                                                                                                                                                                    |
|-----------------|-----------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                       |                 | <ul style="list-style-type: none"><li>• <b>Stereographic</b></li><li>• <b>Equidistant</b></li><li>• <b>Equisolid</b></li><li>• <b>Orthographic</b></li></ul>                                                                                                                |
| Focal Length    | focal                 | 9               | Sets the camera focal length (in mm).                                                                                                                                                                                                                                       |
| Sensor Size x,y | sensorSize            | 36,24           | Sets the size of the camera sensor (in mm).                                                                                                                                                                                                                                 |
| Beam Splitter   |                       |                 |                                                                                                                                                                                                                                                                             |
| Enable          | enableBeamSplitter    | disabled        | When enabled, the <b>Direction</b> and <b>Bending</b> controls are enabled to manage images created using a beam splitter.                                                                                                                                                  |
| Direction       | beamSplitterDirection | 0               | Controls the beam splitter's cylindrical direction and bending.                                                                                                                                                                                                             |
| Bending         | beamSplitterBending   | 0               |                                                                                                                                                                                                                                                                             |
| Distortion      |                       |                 |                                                                                                                                                                                                                                                                             |
| Type            | distortionModelType   | Radial Standard | Sets the distortion model type, though selecting a <b>Preset</b> alters the selection as appropriate: <ul style="list-style-type: none"><li>• <b>Radial Standard</b></li><li>• <b>Radial Asymmetric</b></li><li>• <b>Radial-Tangential</b> (Coupled or Uncoupled)</li></ul> |
| Order           | distortionOrder       | 0,2             | Sets the order of the radial distortion's rational polynomial function.<br><br>The first term controls the                                                                                                                                                                  |

| Control (UI) | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|--------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                          |               | <p>numerator order and the second controls the denominator order.</p> <div>  <b>Note:</b> The default values (0, 2) correspond to the legacy NukeX model. </div>                                                                                                                           |
| Exponent     | distortionExponent       | 2,2           | <p>Sets the base exponent of the radial distortion polynomial.</p> <p>The first term controls the numerator exponents and the second controls the denominator exponents.</p> <div>  <b>Note:</b> A base exponent of 2 for the denominator corresponds to the classic NukeX model. </div> |
| Direction    | distortionModelDirection | Forward       | <p>Set the distortion model direction:</p> <ul style="list-style-type: none"> <li>• <b>Forward</b> - estimated directly but needs to be inverted for image rendering.</li> </ul> <p>The <b>NukeX Classic</b> model is an example of a</p>                                                                                                                                     |

| Control (UI)             | Knob (Scripting)        | Default Value                                       | Function                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|-------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                         |                                                     | <p><b>Forward</b> model.</p> <ul style="list-style-type: none"> <li>• <b>Backward</b> - estimated using its inverse but can be used directly for image rendering. Model inversion is not an exact process and may cause loss of information due to approximations.</li> </ul> <p>The <b>CaraVR Radial</b> model is an example of a <b>Backward</b> model.</p> |
| Normalisation            | normalisationType       | Maximum                                             | <p>Sets how the focal length and distortion parameters are normalized:</p> <ul style="list-style-type: none"> <li>• <b>Width</b></li> <li>• <b>Height</b></li> <li>• <b>Diagonal</b></li> <li>• <b>Maximum</b></li> </ul>                                                                                                                                     |
| Distort in Fisheye Space | distortInFisheyeSpace   | enabled (if a fisheye Projection Model is selected) | <p>When the <b>Project Model</b> is set to <b>Fisheye</b>, this control determines whether to remove or apply the distortion in fisheye or rectilinear space, that is, before or after 'defishing' the lens.</p>                                                                                                                                              |
| Equation x               | distortionModelDisplayX | $x_u = x_d / (1 + k_0 * r_d^2 + k_1 * r_d^4)$       | <p>Distortion model equation display.</p> <p>Legend: (xd, yd) are the distorted cartesian coordinates, (rd, phid) are</p>                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting)        | Default Value                                 | Function                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|-------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                         |                                               | the distorted polar coordinates, (xu, yu) are the undistorted cartesian coordinates, (ru, phiu) are the undistorted polar coordinates, and the k-values are the distortion coefficients. The coordinate systems are relative to the distortion centre.                                                                                                                           |
| Equation y   | distortionModelDisplayY | $y_u = y_d / (1 + k_0 * r_d^2 + k_1 * r_d^4)$ | <p>Distortion model equation display.</p> <p>Legend: (xd, yd) are the distorted cartesian coordinates, (rd, phid) are the distorted polar coordinates, (xu, yu) are the undistorted cartesian coordinates, (ru, phiu) are the undistorted polar coordinates, and the k-values are the distortion coefficients. The coordinate systems are relative to the distortion centre.</p> |

The denominator and numerator controls are dependent on the distortion **Model Preset** applied on the **LenDistortion** tab.



| Control (UI)                                                                                                                                           | Knob (Scripting)           | Default Value | Function                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Denominator s                                                                                                                                          | distortionDenominator0Link | 0             | Sets the denominator coefficients for the symmetric coefficients (s) of the distortion model.                                                     |
|                                                                                                                                                        | distortionDenominator1Link | 0             | These controls are linked to the controls of the same name on the <b>LenDistortion</b> tab.                                                       |
| Numerator s                                                                                                                                            | distortionNumerator0       | 0             | Sets the numerator coefficients for the symmetric coefficients (s) of the distortion model.                                                       |
|                                                                                                                                                        | distortionNumerator1       | 0             | These controls are linked to the controls of the same name on the <b>LensDistortion</b> tab.                                                      |
| Centre                                                                                                                                                 | centreLink                 | 0,0           | <p>Sets the position of the distortion center.</p> <p>This control is linked to the control of the same name on the <b>LenDistortion</b> tab.</p> |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                            |               |                                                                                                                                                   |
| before render                                                                                                                                          | beforeRender               | none          | These functions run prior to starting rendering in <b>execute()</b> . If they throw an exception, the render aborts.                              |
| before each frame                                                                                                                                      | beforeFrameRender          | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the                                         |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | render aborts.                                                                                                                                       |
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |

# Mirror

This node flips the input image around the center of the format area. A flip on the x axis mirrors the image vertically. A flop on the on the y axis mirrors the image horizontally.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | unnamed         | The image sequence to flip vertically or flop horizontally. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------|
| Mirror Tab   |                  |               |                                                               |
| Horizontal   | Horizontal       | disabled      | When enabled, Nuke flops the image 180 on the y axis.         |
| Vertical     | Vertical         | disabled      | When enabled, Nuke flips the image 180 degrees on the x axis. |

# PointsTo3D

Use the PointsTo3D node to calculate the 3D location of a 2D point in an image sequence using the parallax between two or three tracked points.

Attach an image and its corresponding tracked camera to the PointsTo3D node inputs. Select the 2D point you want to calculate, place **A** on that point at a particular frame and click **set frame**. Now, change the frame to a different camera angle and specify that same 2D feature with **B** and click **set frame**. Repeat for point **C**, again on a different frame. Click **calculate** to generate the point in 3D space as well as that point converted back to screen space.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | cam             | A Camera node whose movement matches that of the camera used to shoot the input sequence. This can be a camera you have created using the CameraTracker node or a camera you have imported from a third-party 3D application, for example. Note that the camera must be animated. |
|                 | img             | The image sequence that has a 2D point whose 3D position you want to calculate.                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PointsTo3D Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Camera type    | cameraMovType    | free move     | <p>Select the type of tracked camera movement:</p> <ul style="list-style-type: none"> <li>• <b>free move</b> - this turns a 2D point in the image into a point in 3D space. This requires the camera to be moving and for you to find the 2D point in three frames. Select the 2D point you want to calculate, place <b>Point A</b> on that point at a particular frame and click <b>set frame</b>. Now, change the frame to a different camera angle and specify that same 2D feature with <b>Point B</b> and click <b>set frame</b>. Repeat for <b>Point C</b>, again on a different frame. Click <b>calculate</b> to generate the point in 3D space as well as that point converted back to screen space. You can also click <b>generate axis</b> to make a 3D Axis object with this position.</li> <li>• <b>nodal</b> - this ignores <b>Point B</b> and <b>Point C</b>. Instead, it just puts <b>Point A</b> a fixed distance in front of the camera, using the Camera's focal length to decide the distance.</li> </ul> |
| Point A        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2D point xy    | pointA           | 50, 0         | Choose a 2D point to track on the X and Y axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| point ref time | ref_timeA        | 0             | The frame number <b>Point A</b> is set to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| set frame      | N/A              | N/A           | Click to set <b>Point A</b> at the current xy location and frame number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Point B        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2D point xy    | pointB           | 100, 0        | Choose a 2D point to track on the X and Y axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| point ref time | ref_timeB        | 0             | The frame number <b>Point B</b> is set to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| set frame      | N/A              | N/A           | Click to set <b>Point B</b> at the current XY location and frame number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Point C        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2D point xy                                                                                                                                            | pointC            | 150, 0        | Choose a 2D point to track on the X and Y axes.                                                                                                                                                                                                                                       |
| point ref time                                                                                                                                         | ref_timeC         | 0             | The frame number <b>Point C</b> is set to. You can leave the <b>point ref time</b> set to zero to omit <b>Point C</b> from the computation. You might want to do this if you have a free moving camera but you only want to use <b>Point A</b> and <b>Point B</b> in the calculation. |
| set frame                                                                                                                                              | N/A               | N/A           | Click to set <b>Point C</b> at the current XY location and frame number.                                                                                                                                                                                                              |
| Output                                                                                                                                                 |                   |               |                                                                                                                                                                                                                                                                                       |
| Calculate                                                                                                                                              | N/A               | N/A           | Click to calculate the 3D point coordinates from the 2D point data.                                                                                                                                                                                                                   |
| 3D point xyz                                                                                                                                           | point3D           | 0             | The calculated X, Y, and Z axis location for the 3D point.                                                                                                                                                                                                                            |
| 2D point xy                                                                                                                                            | point2D           | 0             | The current X and Y axis location of the <b>point2d</b> marker.                                                                                                                                                                                                                       |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                       |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                          |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                                                              |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.                                                                                                                                  |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                                                                                                                                                             |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                                                                                                                                                                |

# Position

Position moves the input image by an integer number of pixels. It fills the area between the original image and the moved image by repeating the edge pixels.

## Inputs and Controls

| Connection Type | Connection Name | Function                    |
|-----------------|-----------------|-----------------------------|
| Input           | unnamed         | The image sequence to move. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                              |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Position Tab   |                  |               |                                                                                                                                                       |
| translate x, y | translate        | 0, 0          | How much to move the image on the x and y axes. Positive values move the image up or to the right, while negative values move it down or to the left. |

# Reconcile3D

Reconcile3D turns a point in 3D space into an x, y position in the camera. The 3D point is controlled by the first fields in the properties panel, and by the optional **Axis** input. The point is projected through the camera to the image and the position of the result is put in **XY output**. In addition, the absolute 3D point is put in **XYZ output** (this is only useful if there is an Axis parent, otherwise it is the same as the input point). This lets you lock a photographed plate to a 3D scene or track.



**Note:** The point must be in front of the camera to evaluate correctly.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                  |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------|
| Input           | axis            | <b>3D point</b> control coordinates are relative to this optional input.                                  |
|                 | cam             | The viewing camera. This might be created using CameraTracker or imported from a 3rd party application.   |
|                 | img             | The image in which you want to position the 3D point.<br>Output resolution is determined from this image. |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                   |
|-----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reconcile3D Tab       |                  |               |                                                                                                                                                            |
| Input                 |                  |               |                                                                                                                                                            |
| 3D point xyz          | point            | 0, 0, 0       | The x, y, and z values of the 3D point that you want to turn into an xy position in the camera.                                                            |
| Output                |                  |               |                                                                                                                                                            |
| create keyframes      | N/A              | N/A           | Click to evaluate the <b>XY output</b> and <b>XYZ output</b> keyframes for a specific frame range.                                                         |
| calculate output live | calc_output      | disabled      | When enabled, the output values update dynamically.                                                                                                        |
| XY output             | output           | 0, 0          | The x and y values of the 3D point projected by the camera to the image. The size of the output image is controlled by the format of the <b>img</b> input. |
| XYZ output            | outputxyz        | 0, 0, 0       | The x, y, and z values of the point in 3D space, transformed by the <b>axis</b> input, if applicable.                                                      |
| 2D transform          |                  |               |                                                                                                                                                            |
| track xy              | track            | 0, 0          | A point of interest in the input image on the x and y axes that you want to match with the Camera                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | movement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| offset xy    | offset           | 0, 0          | Extra translation of the input image on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| stabilize    | stabilize        | disabled      | Normally the transformation moves the track point to the projected 3D point, thus moving a plate to match a 3D scene. If you check this, the transformation is reversed to remove 3D motion by moving the projected 3D point to the track point.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| filter       | filter           | Parzen        | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> </ul> |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul>                                                                                                                                                                            |
| clamp         | clamp            | disabled      | Sets negative intermediate and final results to zero. This will remove ringing around mattes when using a filter that has negative lobes. When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                               |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               |  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| motionblur     | motionblur       | 0             | <p>Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| shutter        | shutter          | 0.5           | <p>Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| shutter offset | shutteroffset    | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify.</li> </ul> |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                  |
|--------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame. |
|              | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                   |

Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.)

|                   |                   |      |                                                                                                                                                      |
|-------------------|-------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| before render     | beforeRender      | none | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                         |
| before each frame | beforeFrameRender | none | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame  | afterFrameRender  | none | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render      | afterRender       | none | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress   | renderProgress    | none | These functions run during rendering to determine progress or failure.                                                                               |

# Reformat

Reformat lets you resize and reposition your image sequences to a different format (width and height). This also allows you to use plates of varying image resolution on a single script without running into issues when combining them. All scripts should include Reformat nodes after each Read node to specify, at the very least, the output resolution of the images in the script.

## Inputs and Controls

| Connection Type | Connection Name | Function             |
|-----------------|-----------------|----------------------|
| Input           | unnamed         | The image to resize. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reformat Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| type         | type             | to format     | <p>Select how to resize the image:</p> <ul style="list-style-type: none"> <li>• <b>to format</b> - Set the output width and height to the selected format. Choose the format in the <b>output format</b> dropdown menu. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the image to the format indicated on the <b>Project Settings</b> dialog.</li> <li>• <b>to box</b> - Set the output width and height to dimensions you define (in pixels). Enter values in the <b>width/height</b> and <b>pixel aspect</b> fields to specify the dimensions. This option is useful for creating a thumbnail of the input image.</li> <li>• <b>scale</b> - Set the output width and height to a multiple of the input size. Use the <b>scale</b> slider to define the factor.</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | The scale factor is rounded slightly, so that the output image is an integer number of pixels in the direction chosen under <b>resize type</b> .                                                                                                                                                                                                                             |
| output format    | format           | root.format   | <p>The format to which you want to output the image sequence. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the image to the format indicated in the <b>Project Settings</b>.</p> <p>This control is only available if you have set <b>type</b> to <b>to format</b>.</p> |
| width/height     | box_width        | 200           | <p>The output width for your image. The units are in pixels.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                         |
|                  | box_height       | 200           | <p>The output height for your image. The units are in pixels.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                        |
| force this shape | box_fixed        | disabled      | <p>When enabled, the output image matches the <b>width/height</b> fields exactly, even if the original image is a different shape. To achieve this, one direction gets either clipped or padded.</p> <p>When disabled, the output image is approximately the same shape as the original, rounded to the nearest integer number of pixels.</p>                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | This control is only available if you have set <b>type</b> to <b>to box</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pixel aspect | box_pixel_aspect | 1             | <p>Sets the pixel aspect ratio for the output image.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| scale        | scale            | 1             | <p>The scale factor for the width and the height. To scale each direction separately using different scale factors, click the <b>2</b> button.</p> <p>This control is only available if you have set <b>type</b> to <b>scale</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| resize type  | resize           | width         | <p>Choose the method by which you preserve or override the original pixel aspect ratio. Select:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - to not resize the original.</li> <li>• <b>width</b> - to scale the original until its width matches the output width. Height is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>height</b> - to scale the original so that it fills the output height. Width is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>fit</b> - to scale the original so that its smallest side fills the output width or height. The longest side is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>fill</b> - to scale the original so that its longest side fills the output width or height. The smallest side is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>distort</b> - to scale the original so that both sides fill the output dimensions. This option does not preserve the original aspect ratio, so distortions may occur.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| center       | center           | enabled       | <p>When enabled, Reformat translates the image to center it in the output.</p> <p>When disabled, Reformat translates the image so that the lower left corners line up.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| flip         | flip             | disabled      | When enabled, Reformat flips the image upside down.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| flop         | flop             | disabled      | When enabled, Reformat flops the image left and right.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| turn         | turn             | disabled      | When enabled, Reformat rotates the image 90 degrees counter-clockwise.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| filter       | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> </ul> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | <ul style="list-style-type: none"> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                      |
| clamp                 | clamp            | disabled      | When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| black outside         | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div> |
| preserve bounding box | pbb              | disabled      | <p>When enabled, pixels outside the output format are preserved.</p> <p>When disabled, pixels outside the output format are clipped off.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# SphericalTransform

SphericalTransform converts images between different projections, including 360 rigs using the CaraVR toolset in NukeX. These view projections can be divided into two broad categories:

- full frame, such as **Latlong**, encompassing the entire 360 world around a single point, and
- partial frame, such as the **Rectilinear** view, that Nuke was designed to work in.



The **Output** rotation is also controllable using an in-viewer control system. Hold down **Ctrl/Cmd+Alt** and left-click and drag to move the image around, setting the pan and tilt setting. Add **Shift** to lock into a single dimension for the movement. In a partial frame projection, use the right mouse button to set the **focal length**, in essence zooming in and out.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Input           | -Z              | An environment map you want to convert to another type. Input names vary according to the <b>Project</b> and <b>Format</b> selected. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SphericalTransform Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Local GPU              | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               |  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.         </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Input                |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Projection           | projTypeInput     | LatLong       | <p>Sets the input projection type from which to convert. The type you select is dependent on what directional information your textures contain. For example, <b>Cube</b> has +X,+Y,+Z -X,-Y,-Z</p> <ul style="list-style-type: none"> <li>• <b>LatLong</b> - the most common full 360 frame projection. Many VR pipelines use latlongs for both ingest and export due to their simplicity and wide use.</li> </ul>                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | <ul style="list-style-type: none"> <li>• <b>Cubemap</b> - another full 360 projection. Each of the six faces is essentially rectilinear, so the data can be more familiar to work in.</li> <li>• <b>Rectilinear</b> - a partial frame, standard projection you're most likely familiar with.<br/>When you're going to or from rectilinear, you're only able to cover part of the frame (up to virtually 180 degrees).</li> <li>• <b>Fisheye</b> - covers a number of projections, all of which emulate common optical models used in fisheye lenses. These are all partial frame projections, and so enable specific camera parameters similar to the <b>Rectilinear</b> projection type.</li> <li>• <b>MirrorBall</b> - A reflective ball, scaled up to fill the available area.</li> </ul> |
| Format       | packingTypeInput    | Image         | <p>Sets how faces in the input cubemap are displayed:</p> <ul style="list-style-type: none"> <li>• <b>Image</b></li> <li>• <b>Views</b></li> <li>• <b>Faces</b></li> </ul> <div>  <p><b>Note:</b> The <b>Format</b> control is only displayed when <b>Projection</b> is set to <b>Cubemap</b>.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                               |
| Packing      | cubemapPackingInput | LL-Cross      | <p>Sets how faces are packed in a single image:</p> <ul style="list-style-type: none"> <li>• <b>LL-Cross</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>6x1</b></li> <li>• <b>3x2</b></li> </ul> <div>  <b>Note:</b> The <b>Packing</b> control is only displayed when <b>Projection</b> is set to <b>Cubemap</b> and <b>Format</b> is set to <b>Image</b>. </div> |



**Note:** The **Focal** to **Shift** controls are only available when **Projection** is set to **Rectilinear** or **Fisheye**.

|                  |                     |               |                                                                                                                                                                                                                                                                                                                                       |
|------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Focal            | focalInput          | 16            | Sets the focal length used for the input cameras.                                                                                                                                                                                                                                                                                     |
| Sensor           | sensorInput         | 36, 24        | Sets the sensor size used for the input cameras.                                                                                                                                                                                                                                                                                      |
| Film Back Preset | filmBackPresetInput | Custom        | Sets the camera <b>Sensor</b> and <b>Focal</b> automatically for the preset selected.                                                                                                                                                                                                                                                 |
| Position         | positionInput       | 0, 0, 0       | Sets the position of the input cameras with respect to the center of the sphere.                                                                                                                                                                                                                                                      |
| K                | KInput              | 0, 0, 0       | Sets the input camera's distortion coefficient on the xyz axes.                                                                                                                                                                                                                                                                       |
| Shift            | shiftInput          | 0, 0          | Sets the input lens's center shift on the xy axes.                                                                                                                                                                                                                                                                                    |
| Rotation         | modelInput          | Pan-Tilt-Roll | Sets the input rotation mode: <ul style="list-style-type: none"> <li>• <b>Look</b> - adds an <b>directionInput</b> widget to the Viewer allowing you to control the input's look direction.</li> <li>• <b>From-To</b> - adds <b>fromInput</b> and <b>toInput</b> widgets to the Viewer allowing you to transform the input</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>by moving the widgets around.</p> <ul style="list-style-type: none"> <li>• <b>Pan-Tilt-Roll</b> - allows you to transform the input using the <b>Pan Tilt Roll</b> controls.</li> <li>• <b>Rotation Angles</b> - allows you to rotate the input using the <b>Rotation Order</b> and <b>Rotation Angles</b> controls.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Pan Tilt Roll | panTiltRollInput | 0, 0, 0       | When <b>Rotation</b> is set to <b>Pan-Tilt-Roll</b> , allows you to transform the input manually.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Output        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Projection    | projTypeOutput   | LatLong       | <p>Sets the output projection type to which the input is converted. The type you select is dependent on what directional information your textures contain. For example, <b>Cube</b> has +X,+Y,+Z -X,-Y,-Z</p> <ul style="list-style-type: none"> <li>• <b>LatLong</b> - the most common full 360 frame projection. Many VR pipelines use latlongs for both ingest and export due to their simplicity and wide use.</li> <li>• <b>Cubemap</b> - another full 360 projection. Each of the six faces is essentially rectilinear, so the data can be more familiar to work in.</li> <li>• <b>Rectilinear</b> - a partial frame, standard projection you're most likely familiar with.<br/>When you're going to or from rectilinear, you're only able to cover part of the frame (up to virtually 180 degrees).</li> <li>• <b>Fisheye</b> - covers a number of</li> </ul> |

| Control (UI) | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                      |               | <p>projections, all of which emulate common optical models used in fisheye lenses. These are all partial frame projections, and so enable specific camera parameters similar to the <b>Rectilinear</b> projection type.</p> <ul style="list-style-type: none"> <li>• <b>MirrorBall</b> - A reflective ball, scaled up to fill the available area.</li> </ul>                                                                      |
| Format       | packingTypeOutput    | Image         | <p>Sets how faces in the output cubemap are displayed:</p> <ul style="list-style-type: none"> <li>• <b>Image</b></li> <li>• <b>Views</b></li> <li>• <b>Faces</b></li> </ul> <div>  <p><b>Note:</b> The <b>Format</b> control is only displayed when <b>Projection</b> is set to <b>Cubemap</b>.</p> </div>                                     |
| Packing      | cubemapPackingOutput | LL-Cross      | <p>Sets how faces are packed in a single image:</p> <ul style="list-style-type: none"> <li>• <b>LL-Cross</b></li> <li>• <b>6x1</b></li> <li>• <b>3x2</b></li> </ul> <div>  <p><b>Note:</b> The <b>Packing</b> control is only displayed when <b>Projection</b> is set to <b>Cubemap</b> and <b>Format</b> is set to <b>Image</b>.</p> </div> |

| Control (UI)                                                                                                                                                                                                                        | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Note:</b> The <b>Focal</b> to <b>Shift</b> controls are only available when <b>Projection</b> is set to <b>Rectilinear</b> or <b>Fisheye</b> . |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Focal                                                                                                                                                                                                                               | focalOutput          | 16            | Sets the focal length used for the output cameras.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sensor                                                                                                                                                                                                                              | sensorOutput         | 36, 24        | Sets the sensor size used for the output cameras.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Film Back Preset                                                                                                                                                                                                                    | filmBackPresetOutput | Custom        | Sets the camera <b>Sensor</b> and <b>Focal</b> automatically for the preset selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Position                                                                                                                                                                                                                            | positionOutput       | 0, 0, 0       | Sets the position of the output cameras with respect to the center of the sphere.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| K                                                                                                                                                                                                                                   | KOutput              | 0, 0, 0       | Sets the output camera's distortion coefficient on the xyz axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shift                                                                                                                                                                                                                               | shiftOutput          | 0, 0          | Sets the output lens's center shift on the xy axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Rotation                                                                                                                                                                                                                            | modeOutput           | Pan-Tilt-Roll | Sets the output rotation mode: <ul style="list-style-type: none"> <li>• <b>Look</b> - adds an <b>directionInput</b> widget to the Viewer allowing you to control the look direction.</li> <li>• <b>From-To</b> - adds <b>fromOutput</b> and <b>toOutput</b> widgets to the Viewer allowing you to transform the rig by moving the widgets around.</li> <li>• <b>Pan-Tilt-Roll</b> - allows you to transform the output using the <b>Pan Tilt Roll</b> controls.</li> <li>• <b>Rotation Angles</b> - allows you to rotate the output using the <b>Rotation Order</b> and <b>Rotation Angles</b> controls.</li> </ul> |
| Pan Tilt Roll                                                                                                                                                                                                                       | panTiltRollOutput    | 0, 0, 0       | When <b>Rotation</b> is set to <b>Pan-Tilt-Roll</b> , allows you to transform the output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | manually.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Filter       | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> -</li> </ul> |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Format        | formatMode       | To Scale      | <p>Sets which format to use or how to compute it starting from the input:</p> <ul style="list-style-type: none"> <li>• <b>To Format</b> - force the specified input format as the output format. When using camera type projections, such as <b>Rectilinear</b>, the <b>sensor size y</b> parameter is ignored.</li> <li>• <b>To Width</b> - the output format has the specified input width, but the height is computed according to the output <b>Projection</b> format ratio.</li> <li>• <b>To Scale</b> - the output format width is computed from the input format width, and the height is computed according to the output <b>Projection</b> format ratio.</li> </ul> |
| Width         | scale            | 1             | Sets the scaling factor to convert input width to output width.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Output Format | output           | root.format   | When <b>Format</b> is set to <b>To Format</b> , specifies the output format used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)      | Knob (Scripting)  | Default Value                          | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AdjustBBox        | adjustBBox        | 0                                      | Increases the size of the output image bounding box.<br><br>You might want to expand the bounding box if you need access to pixels at the edge of the image for nodes such as Blur or LensDistortion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Swap Input/Output | swap              | N/A                                    | Click to swap the <b>Input</b> and <b>Output</b> control settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CaraVR Options    |                   |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Metadata          | metaDataOperation | Ignore                                 | <p>Sets how incoming metadata is handled:</p> <ul style="list-style-type: none"> <li>• <b>Ignore</b> - any metadata present in the stream is passed downstream unaltered.</li> <li>• <b>Apply</b> - rotates the image according to the metadata in the stream and the total transform described by the controls in the C_SphericalTransform node.</li> </ul> <div>  <b>Note:</b> This option assumes that the incoming image is in LatLong space. </div> <ul style="list-style-type: none"> <li>• <b>Transform</b> - sets the output metadata to the sum of the input metadata and the total transform described by the controls in the C_SphericalTransform node, but does not modify the output image.</li> </ul> |
| Export            | exportMenu        | C_SphericalTransform (Inverted Linked) | <p>Sets the export nodes to add to the Node Graph:</p> <ul style="list-style-type: none"> <li>• <b>C_SphericalTransform (Inverted</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p><b>Linked</b>) - creates an expression linked C_SphericalTransform set to invert the current transforms.</p> <p>This can be useful when switching between rectilinear and latlong to perform VFX tasks, such as roto.</p> <ul style="list-style-type: none"> <li>• <b>C_SphericalTransform (Concatenated)</b> - sets the current C_SphericalTransform node to <b>Input+Output</b> mode and creates a second C_SphericalTransform node in <b>Input</b> mode.</li> </ul> <p>This can be used to create incremental latlong rotations without introducing unnecessary filtering hits by passing only metadata downstream until the final C_SphericalTransform in the node tree performs the concatenated rotation.</p> |
| Create       | exportButton     | N/A           | Click to create the export specified in the export dropdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# SplineWarp

The SplineWarp node warps an image based on multiple shapes or pins that you create. Unlike the GridWarp node, you can draw these shapes anywhere on either image, rather than only add points on the existing grid lines, and corresponding shapes can have differing numbers of points. You can also copy and paste shapes from other SplineWarp and [Roto](#) or [RotoPaint](#) nodes.

See also [GridWarp](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | A               | The image to warp from, though B to A warps are equally valid.                                                                                                                                                                                                                                                                               |
|                 | B               | The image to warp to, though B to A warps are equally valid.                                                                                                                                                                                                                                                                                 |
|                 | mask            | <p>An optional image to use as a mask. By default, the warp effect is limited to the non-black areas of the mask. All channels for pixels outside the mask region are copied from input A.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask.</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SplineWarp Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                             |
| channels          | channels         | all           | <p>The warp effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> <div>  <b>Note:</b> There is no need to include the output mask channel in this layer. </div> |
| premultiply input | premultiply      | disabled      | <p>When enabled, premultiply the input channels by a mask from the combined <b>cookie cutter</b> shapes prior to warping. This control uses the same mask as <b>output mask</b> but may be used without assigning an <b>output mask</b> channel.</p>                                                                                                                                        |

| Control (UI)        | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |                  |  <b>Note:</b> This control can only be enabled when the <b>curves</b> list contains shapes designated as <b>cookiecutters</b> .                                                                                                                                                                                                                                                           |
| output mask         | outputMask       | mask_splinwarp.a | Sets the channel to be replaced by a mask from the combined cookie cutter shapes.<br><br> <b>Note:</b> This control can only be enabled when the <b>curves</b> list contains shapes designated as <b>cookiecutters</b> .                                                                                                                                                                  |
| crop to format      | crop_to_format   | enabled          | When disabled, the input image is not cropped to the <b>Project Settings &gt; full format size</b> . As a result, warping can introduce pixels from the image outside the format size, rather than black.<br><br> <b>Note:</b> Disabling <b>crop to format</b> can affect performance as Nuke has to calculate the warp for the entire image, not just the area inside the format size. |
| bbox boundary curve | boundary_bbox    | enabled          | When enabled, a curve is added at the format boundaries, effectively pinning the corners of the image.<br><br>This boundary can be tightened by increasing <b>boundary curve resolution</b> on the <b>Render</b> tab.                                                                                                                                                                                                                                                      |
| output              | output           | source warped    | Controls what output is displayed in the Viewer: <ul style="list-style-type: none"> <li>• <b>A</b> - the A input image.</li> <li>• <b>A warped</b> - the warped A input image.</li> <li>• <b>B</b> - the B input image.</li> <li>• <b>B warped</b> - the warped B input image.</li> <li>• <b>AB morph</b> - the morphed image, controlled by the <b>warp</b> and <b>mix</b> controls.</li> </ul>                                                                           |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mix          | mix              | 0             | <p>Dissolves between the source image (at 0) and the destination image (at 1).</p> <div>  <b>Note:</b> This control is only enabled when output is set to <b>AB morph</b>.         </div>                                                                                                                                                                                      |
| root warp    | root_warp        | 1             | <p>Sets the global warp multiplier for all shape pairs and layers in the <b>curves</b> list.</p> <p>For AB pairs, <b>root warp</b> determines the warp where the A image is warped towards B by the warp amount. B is warped towards A by 1-warp.</p>                                                                                                                                                                                                           |
| layer warp   | layer_warp       | 1             | <p>Sets the warp multiplier for all selected layers in the <b>curves</b> list.</p> <div>  <b>Note:</b> This control is disabled when anything other than <b>layers</b> are selected in the <b>curves</b> list.         </div>                                                                                                                                                 |
| pair warp    | pair_warp        | 1             | <p>Sets the warp multiplier for the selected pairs of shapes in the <b>curves</b> list.</p> <p>For AB pairs it determines the warp where the A image is warped towards B by the warp amount. B is warped towards A by 1-warp.</p> <div>  <b>Note:</b> This control is disabled when anything other than paired shapes are selected in the <b>curves</b> list.         </div> |
| spline key   | key              | 0, 0          | <p>Controls spline keyframes:</p> <ul style="list-style-type: none"> <li>• <b>keys</b> - displays the current and total number of keyframes.</li> <li>•  - browse to the previous and next keyframe.</li> </ul>                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li> - add or remove a keyframe on the current frame.</li> </ul> <div>  <b>Note:</b> If Viewer tools <b>auto</b> is enabled, any changes to the splines are automatically set as keyframes at the current frame. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| curves list  | curves           | N/A           | <p>Shows the hierarchy of shapes and groups, allowing you to adjust them and how they're displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Name</b> - Double-click to edit the shape or group Name.</li> <li>• <b>Pairing</b> - Displays the pairing relationship between shapes.</li> <li>• <b>Type</b> - Displays which input shapes exist in A, B, or AB.</li> <li>•  - Designates the shape or layer as <b>transform linked</b> to another shape or layer. Entries linked this way are affected by transforms applied to transform source.</li> <li>•  - Designates the shape as a <b>cookie cutter</b> for the <b>premultiply</b> and <b>output mask</b> controls.</li> <li>•  - Whether the shape or layer is visible and rendered or not.</li> <li>•  - Lock or unlock the shape or layer.</li> <li>•  - Set the color in which you want the outline of your shape to appear in the Viewer.</li> <li>•  - Toggles whether or not the current shape is a hard boundary (removes warping outside the shape).</li> <li>•  - Indicates whether or not the current shape is a</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>boundary (limits warping).</p> <p>Use the shape list to:</p> <ul style="list-style-type: none"> <li>• Select multiple items to adjust attributes on all the selected list items.</li> <li>• Drag and drop to re-order or move items between layers.</li> <li>• Right-click for a context menu containing <b>Addnewlayer</b> and shape editing functions such as <b>Copy</b>, <b>Paste</b>, and <b>Duplicate</b>.</li> </ul> |
| Transform Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                |
| translate xy  | translate        | 0, 0          | <p>Translates the selected curves on the x and y axes.</p> <p>Alternatively, you can drag on an axis on the transformation overlay in the Viewer.</p>                                                                                                                                                                                                                                                                          |
| rotate        | rotate           | 0             | <p>Rotates the selected curves around the <b>center xy</b> coordinates.</p> <p>Alternatively, you drag the transformation overlay in the Viewer.</p>                                                                                                                                                                                                                                                                           |
| scale         | scale            | 1             | <p>Scales the selected curves' width and height.</p>                                                                                                                                                                                                                                                                                                                                                                           |



| Control (UI)              | Knob (Scripting)  | Default Value             | Function                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|-------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |                   |                           | Setting one of these to a negative value reverses the curve along that axis.                                                                                                                                                                                                                                                                                                                       |
| skew X                    | skewX             | 0                         | Skews the selected curve(s) on the x axis.                                                                                                                                                                                                                                                                                                                                                         |
| skew Y                    | skewY             | 0                         | Skews the selected curve(s) on the y axis.                                                                                                                                                                                                                                                                                                                                                         |
| skew order                | skew_order        | XY                        | Sets the order in which skew transforms are applied to the selected curve(s): <ul style="list-style-type: none"> <li>• XY</li> <li>• YX</li> </ul>                                                                                                                                                                                                                                                 |
| center xy                 | center            | Dependent on source input | Sets the center of scaling and rotation for the selected curves.                                                                                                                                                                                                                                                                                                                                   |
| extra matrix              | transform_matrix  | N/A                       | Copy tracking information from either a Tracker or Roto/RotoPaint node to this matrix.<br><br>Warpers linked in this way follow the information from the imported track automatically.                                                                                                                                                                                                             |
| Render Tab                |                   |                           |                                                                                                                                                                                                                                                                                                                                                                                                    |
| curve resolution          | curverez          | 3                         | Adjusts the accuracy of the warp/spline match. Higher values increase accuracy, but sacrifice speed and vice-versa. <div>  <b>Note:</b> Correspondence points may be used to improve the warping accuracy in a specific part of the curve if turning this value up too high causes performance problems. </div> |
| boundary curve resolution | boundary_curverez | 3                         | Adjusts the number of interpolated points on <b>boundary</b> and <b>hard boundary</b> curves. Higher values stop the warp from filtering through the boundary curves, but sacrifice speed and vice versa.                                                                                                                                                                                          |
| preview resolution        | previewrez        | 100                       | Improves the accuracy of the preview at higher values and the rendering speed at lower values.                                                                                                                                                                                                                                                                                                     |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Classic warping | rbf              | disabled      | <p>Sets the type of warp function to use:</p> <ul style="list-style-type: none"> <li>• <b>disabled</b> - uses an updated quadratic warp function that copes well with overlapping control points, but has a more local warp effect.</li> <li>• <b>enabled</b> - employs a warping function from previous versions of Nuke that has a more global warp effect, but doesn't cope well with overlapping control points. Additionally, <b>Classic warping</b> produces a more linear warp between points, which may produce better results when using a cookie cutter mask to cut out the warped image.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| filter          | filter           | cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |

# Stabilize

The Stabilize2D node is designed to remove unwanted camera movement, rotation, and/or scaling from an image sequence. The node requires data from only a single track if you only need to stabilize movement; it requires data from two tracks if you need to stabilize for rotation and/or scaling.

The basic procedure for using Stabilize2D is to first use the [Tracker](#) node to generate the required tracks, then follow the Tracker node with a Stabilize2D node. To this node, you apply the tracking data in inverse form, thus negating the unwanted transformations.

# STMap

The STMap node allows you to move pixels around in an image. STMap uses two channels to figure out where each pixel in the resulting image should come from in the input channels. You can use the Copy node to merge the two distortion channels in with your image channels and then select the two channels in the **U** and **V** selection boxes. The U and V values are the absolute position of the source pixel. The values are

normalized to be between 0 and 1, where 0 is the bottom left corner of the input image, and 1 is the top right corner.

You can also calculate the lens distortion on one image and apply that distortion to another image using the STMap node. See [LensDistortion](#) for more details.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | stmap           | The input you want to use to alter the source image.                                                                                                                                                                                                                                                                                                                        |
|                 | src             | The source image to which you want to apply the effect.                                                                                                                                                                                                                                                                                                                     |
|                 | mask            | <p>An optional image to use as a mask. By default, the distortion is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| STMap Tab    |                  |               |                                                                                                                                                                                                                                                                                                 |
| channels     | channels         | all           | <p>The distortion is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                       |
| UV channels  | uv               | none          | The two channels that are used to calculate the distortion for the input image. The U and V values are the absolute position of the source pixel. The values are normalized to be between 0 and 1, where (0,0) is the bottom left corner of the input image, and (1,1) is the top right corner. |
| blur channel | N/A              | disabled      | Enables the associated blur channel to the right.                                                                                                                                                                                                                                               |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|               | blur             | none          | Values in this channel are added to the size of the area to sample, to add extra blur or diffusion to the distortion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| blur scale    | blur_scale       | 1             | Adjust the blur amount by multiplying the blur values by this.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| mask channel  | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|               | maskChannel      | none          | The channel to use as a mask. The distortion is limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| invert        | invert_mask      | disabled      | Inverts the mask so the distortion is limited to the non-white areas of the mask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| premultiplied | premultiplied    | disabled      | Check this if the <b>UV</b> and <b>blurchannels</b> have been premultiplied by the alpha channel, such as when output by a renderer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| filter        | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative - y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |

# Tile

Tile produces an output image that contains scaled-down, tiled copies of the input image. The output image is the same format as the input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                   |
|-----------------|-----------------|--------------------------------------------|
| Input           | unnamed         | The image to reproduce by rows or columns. |

| Control (UI) | Knob (Scripting) | Default Value | Function |
|--------------|------------------|---------------|----------|
| Tile Tab     |                  |               |          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rows         | rows             | 1             | The number of times the image is replicated vertically. Note that the value can be fractional.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| mirror       | mirrorRows       | disabled      | Check this to flip adjacent tiles vertically to form mirror images.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| columns      | columns          | 1             | The number of times the image is replicated horizontally. Note that the value can be fractional.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| mirror       | mirrorColumns    | disabled      | Check this to flip adjacent tiles horizontally to form mirror images.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| filter       | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most. |

# Tracker

This is a 2D tracker that allows you to extract animation data from the position, rotation, and size of an image. Using expressions, you can apply the data directly to transform and match-move another element. Or you can invert the values of the data and apply them to the original element - again through expressions - to stabilize the image.

This is the general process for tracking an image:

1. Connect a Tracker node to the image you want to track.
2. Use auto-tracking for simple tracks or place tracking anchors on features at keyframes in the image.
3. Calculate the tracking data.
4. Choose the tracking operation you want to perform: **stabilize**, **match-move**, etc.

See the [Tracker](#) section for details on tracking methods and troubleshooting tips.

## Inputs and Controls

| Connection Type | Connection Name | Function                        |
|-----------------|-----------------|---------------------------------|
| Input           | unnamed         | The sequence you want to track. |



| Control (UI) | Knob (Scripting) | Default Value             | Function                                                                                                                                                                                                                 |
|--------------|------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tracker Tab  |                  |                           |                                                                                                                                                                                                                          |
| Tracks       |                  |                           |                                                                                                                                                                                                                          |
| e            | N/A              | enabled                   | When enabled, the associated <b>track</b> anchor in the Viewer is used to track a feature from the input.                                                                                                                |
| name         | N/A              | track 1                   | Sets the track name.                                                                                                                                                                                                     |
| track_x      | N/A              | Dependent on source input | Adjusts the <b>x</b> coordinates of the associated <b>track</b> anchor's center.                                                                                                                                         |
| track_y      | N/A              | Dependent on source input | Adjusts the <b>y</b> coordinates of the associated <b>track</b> anchor's center.                                                                                                                                         |
| offset_x     | N/A              | 0                         | Sets the offset amount, in pixels, between the tracking anchor and the feature position on the x and y axes.                                                                                                             |
| offset_y     | N/A              | 0                         | This is especially useful when the feature you want to track is obscured or otherwise unavailable, enabling you to track another pattern to produce the required tracking data.                                          |
| T            | N/A              | enabled                   | When enabled, translation is calculated during tracking.                                                                                                                                                                 |
| R            | N/A              | disabled                  | When enabled, rotation is calculated during tracking.<br><br><div> <b>Note:</b> Tracking rotation requires at least two tracks.</div> |
| S            | N/A              | disabled                  | When enabled, scale is calculated during tracking.<br><br><div> <b>Note:</b> Tracking scale requires at least two tracks.</div>       |

| Control (UI)       | Knob (Scripting) | Default Value                   | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| error              | N/A              | 0                               | Displays the overall track error rating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| add track          | add_track        | N/A                             | Click to add a new track and anchor to the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| delete track       | del_tracks       | N/A                             | Click to delete all selected tracks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| select all         | select_all       | N/A                             | Click to select all tracks in the Tracks list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| average tracks     | average_tracks   | N/A                             | Click to average all selected tracks together into a single new track. This can be especially useful for stabilization tracking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Export CornerPin2D |                  |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CornerPin Options  | cornerPinOptions | CornerPin2D (use current frame) | <p>Sets the node to output when you click <b>create</b>. The <b>baked</b> options do not use expression links between Tracker and the exported node:</p> <ul style="list-style-type: none"> <li>• <b>CornerPin2D (use current frame)</b> - creates an expression linked CornerPin2D node that warps the image according to the relative transform, using the current frame as a reference.</li> <li>• <b>CornerPin2D (use transform ref frame)</b> - creates an expression linked CornerPin2D node that warps the image according to the relative transform, using the frame specified in the <b>Transform</b> tab as a reference.</li> <li>• <b>Transform (stabilize)</b> - creates an expression linked Transform node with control presets to stabilize the clip.</li> <li>• <b>Transform (match-move)</b> - creates an expression linked Transform node with control presets to match-move the clip.</li> </ul> |
| create             | createCornerPin  | N/A                             | Click to create the CornerPin2D or Transform node specified in <b>Export</b> dropdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                 | Knob (Scripting)             | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                              |               |  <b>Note:</b> There must be 4 tracks selected in the <b>Tracks</b> list to create a CornerPin2D node.                                                                                                                                                                                                                                                                                                                                                                                                           |
| Settings Tab                 |                              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| General                      |                              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| track channels               | channels                     | rgb           | <p>Tracking only occurs in these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                  |
| pre-track filter             | pretrack_filter              | median        | <p>Sets the filter applied before image patches are compared:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no filter is applied.</li> <li>• <b>adjust contrast</b> - the default filter, stretches the image contrast to better suit the tracking algorithm. This is the recommended setting and shouldn't need changing in most circumstances.</li> <li>• <b>median</b> - attempts to remove image noise.</li> </ul>                                                                                                                                                              |
| adjust for luminance changes | adjust_for_luminance_changes | disabled      | <p>When enabled, Tracker does some extra pre-filtering to compensate for changes in brightness.</p> <p>This option slows the tracking process and can reduce the accuracy of tracks, so only enable this control if there are known changes in brightness.</p> <div>  <b>Note:</b> Enabling <b>adjust for luminance changes</b> can occasionally produce better tracks on shots with no differences in luminance, particularly on jittery shots where sub-pixel accuracy is vitally important.         </div> |

| Control (UI)                        | Knob (Scripting)          | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------|---------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| max iterations                      | max_iter                  | 100           | <p>Sets the maximum number of iterations before the tracking algorithm stops searching for features.</p> <div>  <b>Note:</b> This setting does not normally need adjusting.         </div>                                                                                                                                                         |
| epsilon / resolution                | epsilon                   | 0.01          | <p>Sets the error level at which Tracker is assumed to have found the feature - no further search for a better match is performed. Higher values may result in a faster but less accurate track.</p> <div>  <b>Note:</b> This setting does not normally need adjusting.         </div>                                                             |
| max_error                           | max_error                 | 0.2           | <p>Sets the error level at which Tracker stops searching for features.</p>                                                                                                                                                                                                                                                                                                                                                          |
| clamp super-white, sub-zero footage | clamp_footage             | enabled       | <p>When enabled, tracked patches are clamped to values between 0-1.</p> <div>  <b>Note:</b> If you want to track using the full dynamic range available in your footage, disable this control and adjust the <b>max-error</b> value accordingly. For example, images with pixel intensity 40 may require a max-error value of 40.         </div> |
| show error on track paths           | show_error_on_track_links | disabled      | <p>When enabled, keyframes on the track are colored according to their relative error:</p> <ul style="list-style-type: none"> <li>• <b>green</b> - a good match for the grabbed pattern.</li> <li>• <b>amber</b> - a reasonable match for the grabbed pattern.</li> <li>• <b>red</b> - a poor match for the grabbed pattern.</li> </ul>                                                                                             |

| Control (UI)                     | Knob (Scripting)             | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------|------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  |                              |               | High track error values aren't necessarily bad keyframes. Rather, they indicate that the pattern has changed considerably since the previous pattern grab.                                                                                                                                                                                                                                                                                                                                                                     |
| hide progress bar                | hide_progress_bar            | disabled      | When enabled, the track progress dialog doesn't display during tracking.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| snap to markers                  | snap_to_markers              | disabled      | When enabled, adding tracks places a guide on suitable marker patterns, such as dots or blobs, in the Viewer. Move the tracking anchor to a guide and release the mouse to snap the anchor to the guide's position.                                                                                                                                                                                                                                                                                                            |
| show zoom window                 | zoom_window_behavior         | always        | <p>Sets when the zoom window is visible in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>always</b> - the zoom window is always visible.</li> <li>• <b>on track change</b> - only display the zoom window when a track changes.</li> <li>• <b>when tracking</b> - only display the zoom window during tracking.</li> <li>• <b>when tracking or track change</b> - only display the zoom window during tracking or when a track changes.</li> <li>• <b>never</b> - the zoom window is never displayed.</li> </ul> |
| zoom window size / magnification | zoom_window_size             | 200px         | Sets the size of the zoom window.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                  | zoom_magnification_size      | x1            | Sets the magnification in the zoom window.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| zoom window filter               | zoom_window_filter_behaviour | on playback   | <p>Sets when filtering is applied to the zoom window:</p> <ul style="list-style-type: none"> <li>• always</li> <li>• on playback</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• never</li> </ul> <div>  <b>Note:</b> The filter applied is the same as that selected on the <b>Transform</b> tab, and can produce a more visually stable track. It can make track positioning more difficult, however. </div>                                                                                                                                                                                                                                                                                                                                              |
| Auto-Tracking |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| predict track | predict_track    | disabled      | <p>When enabled, use the current tracker animation path to determine where to look in the next frame.</p> <div>  <b>Note:</b> If Tracker fails to find the feature in the next frame, click the <b>clearfwd</b> button above the Viewer before continuing, or the same error is repeated. </div>                                                                                                                                                                                                                                                                                                                    |
| warp type     | warp             | Translate     | <p>Selects the transformations that are tried on the pattern to match it to the image. <b>Translate</b> is fastest, but may lose the track if the pattern rotates, scales, or shears over the course of the track:</p> <ul style="list-style-type: none"> <li>• <b>Translate</b> - only expect pattern translation.</li> <li>• <b>Translate/Rotate</b> - expect pattern translation and rotation.</li> <li>• <b>Translate/Scale</b> - expect pattern translation and scaling.</li> <li>• <b>Translate/Rotate/Scale</b> - expect pattern translation, rotation, and scaling.</li> <li>• <b>Affine</b> - expect straight lines and the distance between the points on them to remain equal.</li> </ul> |

| Control (UI)          | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |                |  <b>Note:</b> This control does not relate to how the image is transformed as an output, but what transforms the pattern matching algorithm utilizes to find the best pattern match.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| pattern grab behavior | grab_behavior    | if error above | <p>Sets when the tracker attempts to grab a new pattern:</p> <ul style="list-style-type: none"> <li>• <b>on first frame</b> - grab a pattern on the first frame only.</li> <li>• <b>every frame</b> - grab a new pattern on every frame.</li> <li>• <b>every n frames</b> - use the <b>every n frames</b> control to specify the frame interval.</li> <li>• <b>if error above</b> - use the <b>when error &gt;</b> control to specify the grab behavior.</li> <li>• <b>if error below</b> - use the <b>when error &lt;</b> control to specify the grab behavior.</li> <li>• <b>custom</b> - use the <b>every n frames</b> and <b>when error &lt;&gt;</b> controls to specify grab behavior.</li> </ul> |
| every n frames        | grab_interval    | 0              | When <b>pattern grab behavior</b> is set to <b>update every n frames</b> or <b>custom</b> , sets the interval at which Tracker automatically re-grabs a pattern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| when error >          | grab_error_above | 0.05           | When <b>pattern grab behavior</b> is set to <b>update if above tolerance</b> or <b>custom</b> , sets the error level above which Tracker automatically re-grabs a pattern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| when error <          | grab_error_below | 0              | When <b>pattern grab behavior</b> is set to <b>update if below tolerance</b> or <b>custom</b> , sets the error level                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)                             | Knob (Scripting)             | Default Value            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------|------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          |                              |                          | below which Tracker automatically re-grabs a pattern.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| when tracking is stopped                 | auto_regrab_pattern          | disabled                 | When enabled, Tracker re-grabs a pattern at the current position each time tracking is stopped.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| when tracker is moved                    | regrab_when_offset           | enabled                  | When enabled, Tracker re-grabs a pattern when a track is manually adjusted.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Keyframe Tracking                        |                              |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| retrack when keyframe is moved / created | retrack_on_move              | enabled                  | When enabled, re-track a pattern when a track is manually adjusted or a new keyframe is created.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| create new key when track is moved       | create_key_on_move           | enabled                  | When enabled, create a new keyframe when the track is manually adjusted.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| auto-tracks delete keyframes             | auto-tracks_delete_keyframes | enabled                  | <p>When enabled, auto-tracking deletes manual keyframes.</p> <p>When disabled, auto-tracking adjusts the position of manual keyframes.</p>                                                                                                                                                                                                                                                                                                                                                                                       |
| keyframe display                         | keyframe_display             | scroll, single line only | <p>Sets how keyframe snapshots are displayed in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>all</b> - show all keyframe snapshots in the available Viewer space.</li> <li>• <b>nearest, single line only</b> - show the nearest keyframe snapshot to the playhead, and the surrounding whole snapshots, on a single line only.</li> <li>• <b>scroll, single line only</b> - show all keyframe snapshots in a scrolling, single line only.</li> <li>• <b>none</b> - don't show any keyframe snapshots.</li> </ul> |
| keyframe size                            | keyframe_size                | 100px                    | Sets the size of keyframe snapshots in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



| Control (UI)              | Knob (Scripting)                         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| on_screen key-track limit | max_number_of_keyframe_tracks_to_display | 3             | <p>Sets the maximum number of tracks with keyframes that can be displayed in the Viewer.</p> <p>Set this control to <b>0</b> to always display selected tracks with keyframes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Transform Tab             |                                          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| transform                 | transform                                | none          | <p>Sets the type of transform to apply.</p> <div>  <b>Note:</b> The <b>transform</b> control must be set to <b>none</b> when calculating tracks. </div> <ul style="list-style-type: none"> <li>• <b>none</b> - no transformation is applied to the input image.</li> <li>• <b>stabilize</b> - transforms the image so that the tracked points do not move.</li> <li>• <b>stabilize 1pt</b> - similar to stabilize, but designed for use with a single track.</li> <li>• <b>match-move</b> - transforms another image so that it moves to match the tracked points.</li> <li>• <b>match-move 1pt</b> - similar to match-move, but designed for use with a single track.</li> <li>• <b>remove jitter</b> - transforms the image so that the tracked points move smoothly, with high-frequencies removed.</li> <li>• <b>add jitter</b> - transform the input image by the high-frequency components of the track to increase the shake or add it to another image.</li> </ul> |
| reference frame           | reference_frame                          | 1             | <p>When <b>transform</b> is set to <b>stabilize</b> or <b>match-move</b>, sets the frame in the input sequence to use as the reference or identity frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| set to current frame      | N/A                                      | N/A           | <p>Click to set the current frame as the reference or identity frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)        | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                    |
|---------------------|--------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| jitter period       | jitter_period      | 10            | When <b>transform</b> is set to <b>add/removejitter</b> , sets the number of frames to average together to get a stable position.                                                                                           |
| smooth              | smoothT            | 0             | Smooths the translation by averaging this many frames together.                                                                                                                                                             |
|                     | smoothR            | 0             | Smooths the rotation by averaging this many frames together.                                                                                                                                                                |
|                     | smoothS            | 0             | Smooths the scale by averaging this many frames together.                                                                                                                                                                   |
| live-link transform | livelink_transform | disabled      | When enabled, changes to tracks instantly update the transform. Dynamic updating may be useful if a track position is controlled by an expression.                                                                          |
| translate xy        | translate          | 0, 0          | Displays the <b>translation</b> applied to the <b>Transform</b> widget for the current track. Once tracking is complete, you can drag-and-drop the translate information to link other nodes, such as the Stabilize node.   |
| rotate              | rotate             | 0             | Displays the <b>rotation</b> applied to the <b>Transform</b> widget for the current track. Once tracking is complete, you can drag-and-drop the rotate information to link other nodes, such as the Stabilize node.         |
| scale               | scale              | 1             | Displays the <b>scale</b> applied to the <b>Transform</b> widget for the current track. Once tracking is complete, you can drag-and-drop the scale information to link other nodes, such as the Stabilize node.             |
| skew X              | skewX              | 0             | Displays the <b>skew</b> applied to the <b>Transform</b> widget on the x axis for the current track. Once tracking is complete, you can drag-and-drop the skew information to link other nodes, such as the Stabilize node. |

| Control (UI) | Knob (Scripting) | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew Y       | skewY            | 0                  | Displays the <b>skew</b> applied to the <b>Transform</b> widget on the y axis for the current track. Once tracking is complete, you can drag-and-drop the skew information to link other nodes, such as the Stabilize node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| skew order   | skew_order       |                    | Sets the order in which skew transforms are applied: <ul style="list-style-type: none"> <li>• <b>XY</b></li> <li>• <b>YX</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| center xy    | center           | Dependant on input | Sets the center of rotation and scaling. You can also <b>cmd</b> + drag the <b>Transform</b> widget in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| filter       | filter           | Cubic              | Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values). <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>smoothing, plus blurring to hide pixelation.</p> <ul style="list-style-type: none"> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul>                                                                                                                                                 |
| clamp         | clamp            | disabled      | <p>When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b>, you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div> |
| motionblur    | motionblur       | 0             | <p>Sets the number of motion blur samples. A value</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                     |               | <p>of 1 should produce reasonable results for most sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter        | shutter             | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| shutter offset | shutteroffset       | start         | <p>Controls how the shutter behaves with respect to the current frame value:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame. |

# Transform

Transform lets you not only translate elements, but also rotate, scale, and skew them from a single control panel.

You can also create this node by pressing **T** on the Node Graph.

See also [TransformMasked](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                        |
|-----------------|-----------------|-------------------------------------------------|
| Input           | unnamed         | The image to translate, rotate, scale, or skew. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                      |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Transform Tab  |                  |               |                                                                                                                                               |
| translate x, y | translate        | 0, 0          | Translates the image along the x and y axes. You can also adjust translate values by dragging the transform handle in the Viewer.             |
| rotate         | rotate           | 0             | Rotates the image around the <b>center x y</b> coordinates. You can also adjust rotate values by dragging the transform handle in the Viewer. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scale        | scale            | 1             | Scales the image width and height around the <b>center x y</b> coordinates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| skew X       | skewX            | 0             | Skews the image on the x axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew Y       | skewY            | 0             | Skews the image on the y axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew order   | skew_order       | XY            | Sets the order in which skew transforms are applied to the image: <ul style="list-style-type: none"> <li>• XY</li> <li>• YX</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| center x, y  | center           | N/A           | Sets the center of rotation and scale on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| invert       | invert_matrix    | disabled      | When enabled, any transform you applied using the <b>translate xy</b> , <b>rotate</b> , <b>scale</b> , <b>skew</b> , or <b>center xy</b> controls is inverted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| filter       | filter           | Cubic         | Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values). <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul>                                                                                              |
| clamp         | clamp            | disabled      | When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div> |
| motionblur    | motionblur       | 0             | Sets the number of motion blur samples. A value of 1 should produce reasonable results for most                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                     |               | <p>sequences.</p> <p>Increase the value to produce more samples for higher quality, or decrease it to shorten the processing time. The higher the value, the smoother the result.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter        | shutter             | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame. Increasing the value produces more blur, and decreasing the value less.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| shutter offset | shutteroffset       | start         | <p>Controls how the shutter behaves with respect to the current frame value:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# TransformMasked

This node lets you translate, rotate, scale, or skew an image in 2D in the same way as the [Transform](#) node, but it also offers controls for assigning a mask to protect certain areas of the frame from transforms.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The input you want to translate, rotate, scale, or skew.                                                                                                                                                                                                                                                                                                                   |
|                 | mask            | <p>An optional image to use as a mask. By default, the transform is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                 |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transform Tab |                  |               |                                                                                                                                                                                                          |
| channels      | channels         | all           | <p>The transform is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |
| translate xy  | translate        | 0, 0          | Translates the input on the x and y axes.                                                                                                                                                                |
| rotate        | rotate           | 0             | Rotates the input by degrees. Negative values produce anti-clockwise rotation.                                                                                                                           |
| scale         | scale            | 1             | Scales the input. Scale width and height are ganged by default.                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew X       | skewX            | 0             | Skews the input on the x axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| skew Y       | skewY            | 0             | Skews the input on the y axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| skew order   | skew_order       | XY            | Sets the order in which skew transforms are applied to the input: <ul style="list-style-type: none"> <li>• XY</li> <li>• YX</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| center xy    | center           | N/A           | The center of rotation and scaling. You can also move it using <b>Ctrl/Cmd</b> +drag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| invert       | invert_matrix    | disabled      | When enabled, any transform you applied using the <b>translate xy</b> , <b>rotate</b> , <b>scale</b> , <b>skew</b> , or <b>center xy</b> controls is inverted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| filter       | filter           | Cubic         | Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values). <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul>                                                                                                                                                                                                     |
| clamp         | clamp            | disabled      | When using filters that employ sharpening, such as <b>Rifman</b> and <b>Lanczos</b> , you may see a haloing effect. If necessary, check <b>clamp</b> to correct this problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| black outside | black_outside    | enabled       | <p>This renders as black pixels outside the image boundary, making it easier to layer the element over another. If you uncheck this control, the outside area is filled with the outermost pixels of the image sequence.</p> <p>In most cases, you should keep <b>black outside</b> checked. However, you may want to turn this off for camera shake, or if you want to texture-map or intersect the output with a similar shape.</p> <div>  <b>Note:</b> Enabling <b>black outside</b> also adds a solid alpha covering the input image area if no alpha is present. </div> |
| motionblur    | motionblur       | 0             | Sets the number of motion blur samples. A <b>motionblur</b> value of 1 should produce reasonable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                     |               | <p>results for most sequences.</p> <p>Increase the <b>motionblur</b> value to produce more samples for higher quality, decrease it to shorten the processing time.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| shutter        | shutter             | 0.5           | How long the shutter remains open (measured in frames) to produce motion blurring. The default value sets the shutter open for half a frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| shutter offset | shutteroffset       | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                | shuttercustomoffset | 0             | If the <b>shutter offset</b> control is set to <b>custom</b> , this field is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | before the current frame.                                                                                                                    |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a matte. By default, the transform is limited to the non-black areas of this channel.                                  |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the transform is limited to the non-white areas of the mask.                                    |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                          |

# TVIScale

This node scales an image by a factor of two. It uses a Total Variational Inpainting (TVI) technique that minimizes noise while still preserving the edges. The **Lambda** control is the main control here. The larger the value, the less smoothing is allowed and the more noise present in the original image makes it to the larger image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The input you want to scale by a factor of two.                                                                                                                                                                                                                                                                                                                            |
|                 | mask            | <p>An optional image to use as a mask. By default, the transform is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TVIScale Tab |                  |               |                                                                                                                                                                                                                                                           |
| channels     | channels         | all           | <p>The scale is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                      |
| Iterations   | Iterations       | 5             | <p>Sets the number of iterations to apply to achieve the best solution.</p> <p>This is an iterative filter - the longer it runs, the closer it gets to the 'best' solution. In this case, the noisy smooth areas converge on a non-noisy smooth area.</p> |
| Lambda       | Lambda           | 5             | <p>Controls how far the filtered values are allowed to stray from the original input.</p> <p>The larger the value, the less smoothing is allowed and the more noise present in the original image makes it to the larger image.</p>                       |
| A            | A                | 0.0001        | This is a regularization control that should always be                                                                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | above zero to prevent Divides-By-Zero in the algorithm.                                                                                      |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                |
|              | maskChannelInput | none          | The channel to use as a matte. By default, the transform is limited to the non-black areas of this channel.                                  |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same mask further downstream. |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that the transform is limited to the non-white areas of the mask.                                    |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.                                                                                 |
|              |                  |               | When disabled, the effect is applied to the entire mask.                                                                                     |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full effect at 1.                                                                          |

# VectorCornerPin

The VectorCornerPin node takes paint or an image from a reference frame and propagates it through the rest of the sequence using the motion vectors generated by the SmartVector node. This node, similar to CornerPin2D, allows you to set keyframes on the image, but uses vector information from SmartVector rather than tracking information to drive the warp.

See [SmartVector](#) and [CornerPin2D](#).



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                             |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Source          | The sequence containing the paint corrections or image and the source of the motion vectors.                                                         |
|                 | SmartVector     | The motion vectors generated by the SmartVector node. You can connect the SmartVector directly or read in the <b>.exr</b> files created by the node. |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VectorDistort Tab |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Local GPU         | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if        | useGPUIfAvailable | enabled       | When enabled, rendering occurs on the <b>Local GPU</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| available                                                                           |                  |               | <p>specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <code>--gpu</code> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| User Keys                                                                           | N/A              | 0             | Displays the total number of user keyframes added to the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                     | N/A              | 0             | Displays the current user keyframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|  | N/A              | N/A           | Click to jump to the previous user keyframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|  | N/A              | N/A           | Click to jump to the next user keyframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|  | N/A              | N/A           | Click to add a user keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|  | N/A              | N/A           | Click to delete the user keyframe at the current frame in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | N/A              | N/A           | Click to delete all keyframes in the sequence, both user and baked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| User1 xy                                                                            | user1            | N/A           | Controls the position of the pins at the current keyframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| User2 xy                                                                            | user2            | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| User3 xy                                                                            | user3            | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| User4 xy                                                                            | user4            | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| To Corners   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| To1 xy       | to1              | N/A           | Displays the position of the pins at the current frame, once you've set a user keyframe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| To2 xy       | to2              | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| To3 xy       | to3              | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| To4 xy       | to4              | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Copy 'From'  | N/A              | N/A           | Click to copy and paste the <b>From1-4</b> values to the <b>To1-4</b> values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Bake Corners | bakeCorners      | N/A           | Click to calculate the position of the pins for each frame specified in the <b>Render</b> dialog. The baked position is driven by the vectors, independent of the user keyframes, so the pins need less drastic correction than between keyframes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Filter       | imageFilter      | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| From Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| From1 xy        | to1              | N/A           | Pin 1 controls the bottom left corner of the warp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| From2 xy        | to2              | N/A           | Pin 2 controls the bottom right corner of the warp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| From3 xy        | to3              | N/A           | Pin 3 controls the top right corner of the warp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| From4 xy        | to4              | N/A           | Pin 4 controls the top left corner of the warp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Set To Input    | N/A              | N/A           | Click to set the From controls to the size of the input format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Copy 'To'       | N/A              | N/A           | Click to copy and paste the <b>To1-4</b> values to the <b>From1-4</b> values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| SmartVector Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Frame Distance  | frameDistance    | 1 frame       | <p>Sets the trade-off between warping things well for nearby frames against frames further away. Each shot has its own optimum <b>frame distance</b> value so try several values to see what produces the best results.</p> <p>For example, warping up to 20-30 frames away from the reference frame, or sequences with rapid motion, typically require values closer to <b>1 frame</b>. Warping over 100 frames away, or sequences with slower motion, typically require values closer to <b>64 frames</b>.</p>                                     |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output                                                                                                                                                 | outputMode        | warped src    | <p>Sets the type of output produced by VectorCornerPin:</p> <ul style="list-style-type: none"> <li>• <b>warped src</b> - output the warped <b>Source</b> input using the reference frame as a template for warping the rest of the sequence.</li> <li>• <b>st-map</b> - output the st-map for the warp from the reference frame to the current frame. This is useful if you want to bake the results of the node for later.</li> <li>• <b>st-map inverse</b> - output the inverse st-map for the warp, that is, the warp from the current frame to the reference frame.</li> </ul> |
| Blur Size                                                                                                                                              | blurSize          | 0             | <p>Controls the amount of blur applied to the internally calculated STMap. Increasing the <b>blur size</b> can remove local distortions in the warped result, particularly in longer sequences.</p>                                                                                                                                                                                                                                                                                                                                                                                |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| before render                                                                                                                                          | beforeRender      | none          | <p>These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| before each frame                                                                                                                                      | beforeFrameRender | none          | <p>These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| after each frame                                                                                                                                       | afterFrameRender  | none          | <p>These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.</p>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| after render                                                                                                                                           | afterRender       | none          | <p>These functions run after rendering of all frames is finished. If they throw an error, the render aborts.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| render progress                                                                                                                                        | renderProgress    | none          | <p>These functions run during rendering to determine progress or failure.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# VectorDistort

The VectorDistort node takes the paint from a reference frame and propagates it through the rest of the sequence using the motion vectors generated by the SmartVector node.

See also [SmartVector](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                         |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Source          | The sequence containing the paint corrections and the source of the motion vectors.                                                              |
|                 | SmartVector     | The motion vectors generated by SmartVector node. You can connect the SmartVector directly or read in the <b>.exr</b> files created by the node. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VectorDistort Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Local GPU         | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               |  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.         </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Reference Frame      | referenceFrame    | 1             | Sets the frame used to calculate the warp at every other frame in the sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| set to current frame | N/A               | N/A           | Click to set the reference frame to the frame currently under the playhead.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Hold Frame           | holdFrame         | enabled       | <p>When enabled, the reference frame is warped instead of the current frame. This is equivalent to inserting a FrameHold node into the node tree after the source.</p> <p>When disabled, the current frame is warped instead of the reference frame.</p>                                                                                                                                                                                                                                                                                                                                                               |
| Frame Distance       | frameDistance     | 1 frame       | <p>Sets the trade-off between warping things well for nearby frames against frames further away. Each shot has its own optimum <b>Frame Distance</b> value so try several values to see what produces the best results.</p> <p>For example, warping up to 20-30 frames away from</p>                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>the reference frame, or sequences with rapid motion, typically require values closer to 1. Warping over 100 frames away, or sequences with slower motion, typically require values closer to 64.</p> <div>  <b>Note:</b> The maximum value for this control is passed down the node tree from a SmartVector node's <b>frame distance</b> control. </div>                                                                                                                                  |
| Output       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Output       | outputMode       | warped src    | <p>Sets the type of output produced by VectorDistort:</p> <ul style="list-style-type: none"> <li>• <b>warped src</b> - output the warped <b>Src</b> input using the reference frame as a template for warping the rest of the sequence.</li> <li>• <b>st-map</b> - output the st-map for the warp from the reference frame to the current frame. This is useful if you want to bake the results of the node for later.</li> <li>• <b>st-map inverse</b> - output the inverse st-map for the warp, that is, the warp from the current frame to the reference frame.</li> </ul> |
| Blur Size    | blurSize         | 0             | <p>Controls the amount of blur applied to the internally calculated STMap. Increasing the <b>blur size</b> can remove local distortions in the warped result, particularly in longer sequences.</p>                                                                                                                                                                                                                                                                                                                                                                           |
| Channels     | channels         | rgba          | <p>Sets the channels to which the warp is applied.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Filter       | imageFilter      | Cubic         | <p>Select the filtering algorithm to apply the warp to the image, similar to that of the filters used in the IDistort and STMap nodes.</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing,</li> </ul>                                                                                                                                                                               |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>plus minor sharpening (as shown by the negative -y portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |

# New 3D System Nodes (Beta)

The new USD-based nodes, which supersede the Nuke's classic 3D nodes, deal with Nuke's 3D workspace, allowing you to set up a 3D composite for camera moves, set replacement, and other applications where you need to simulate a "real" dimensional environment.

These nodes are currently in the Beta phase so that we can gather artist feedback to improve the system before deprecating the classic 3D nodes.

Join us to help develop the future of 3D compositing workflows in Nuke:

<https://community.foundry.com/discuss/nuke3d>

## Axis

Axis nodes act as null objects by adding a new transformational axis to which other objects may be parented. Even when objects already have their own internal axes, it's sometimes useful to parent in a separate axis. For example, when an Axis node is parented to other objects in a scene, the node globally controls the scene - rotating the axis rotates all objects in the scene.



**Tip:** Axis's classic 3D system equivalent is the [Axis](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node.<br><br>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object. |
|                 | scene           | An optional input to import scene data.                                                                                                                                                                                                                                                                                                                  |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Axis Tab          |                  |               |                                                                                                                                                                                                                                                                                                                          |
| Import Scene Prim | import_enabled   | off           | When disabled, the camera is configured using the controls under <b>Local Xform</b> on the <b>Camera</b> tab. Enable <b>Import Scene Prim</b> if you want to read in camera information from a file or from the scene graph.                                                                                             |
| Import From       | import_source    | N/A           | When Import Scene Prim is enabled, determines where the camera is loaded from: <ul style="list-style-type: none"> <li>• <b>File Path</b> - a file on disk specified by the <b>File Path</b> control.</li> <li>• <b>Scene Input</b> - a scene graph location specified by the <b>Import Prim Path</b> control.</li> </ul> |
| Reload            | Reload           | N/A           | Click to reload the camera information from the specified file or scene graph location. <div>  <b>Warning:</b> Any local changes you have made are overwritten by the imported camera data when you click <b>Reload</b>. </div>       |
| File Path         | file             | none          | Sets the file path from which you intend to import camera information, if the <b>scene</b> input is not connected.                                                                                                                                                                                                       |
| Import Prim Path  | import_prim_path | none          | Sets the absolute scene graph path to the prim from which to import camera data.                                                                                                                                                                                                                                         |
| Output Prim Path  | prim_path        | none          | Sets the scene graph path for the new camera prim, such as <b>/Scene/Cameras/Camera1</b> .<br><br>If the output path is left blank, the node name is used with a preceding / (forward slash). For example, <b>/Camera1</b> .                                                                                             |
| Parent Type       | parent_prim_type | Xform         | Sets the type of prim to create if there are missing ancestors in the path.                                                                                                                                                                                                                                              |

| Control (UI)      | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                     |               |  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist.                                                                                                                                                                                                                                                                                                  |
| Passthrough       | passthrough_enabled | off           | <p>When enabled, this node does not create output prims or affect the incoming scene file or scene graph.</p> <p>Any controls affecting output transforms still affect direct node connections, but those transforms are not output to prims in the output scene.</p> <p>A simple use case for passthrough might be importing a transform from an input prim and modifying or re-parenting the transform using the <b>axis</b> input or <b>Local Parent Xform</b> controls without affecting the source prim.</p> |
| Merge Input Scene | merge_enabled       | off           | <p>When enabled, the input scene is merged with this node's output scene.</p> <div>  <b>Note:</b> If the output prim path matches an existing path in the input scene, this node overwrites the existing prim.         </div>                                                                                                                                                                                                  |
| Lock Read Frame   | lock_read_frame     | off           | <p>When enabled, only the frame specified in the <b>read_frame</b> control is read.</p> <p>When disabled, all frames are read.</p>                                                                                                                                                                                                                                                                                                                                                                                |
|                   | read_frame          | 0             | <p>When <b>lock_read_frame</b> is enabled, specify the frame number to read or use the <b>read_frame</b> animation control to read any frame speed curve.</p>                                                                                                                                                                                                                                                                                                                                                     |
| Lock Read View    | lock_read_view      | off           | <p>When enabled, only the view specified in the <b>read_view</b> control is read.</p> <p>When disabled, all views are read.</p>                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)  | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | read_view             | main          | When <b>lock_read_view</b> is enabled, specify the view to read.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Frame: Origin | frame_origin          | 0             | <p>Sets the origin of the incoming frame range. Any frame rate change is scaled from this point allowing it to remain unchanged on the output frame slider.</p> <p>This can be very useful to keep an important frame in a time-warped range from shifting unexpectedly on the timeline. For example, if shot animation begins at frame 101, but there are some preroll keys at frames 50-100, then setting this control to 101 keeps that frame from changing when a frame rate change is applied, preserving the start of the shot.</p> |
| Rate          | frame_rate            | 24            | <p>Sets the frame rate (frames per second) used to sample the geometry file.</p> <p>If this rate is lower than the rate encoded in the file, animation is slowed down. For example, if the file was animated at 24 fps and <b>Rate</b> is set to 12, the animation is read at half speed.</p>                                                                                                                                                                                                                                             |
| Output Offset | frame_offset          | 0             | <p>Offsets the incoming keyframes in time by the number of frames specified. The offset is applied after any frame rate change.</p> <p>The offset shifts the final, possibly time-warped keyframes in the frame slider.</p>                                                                                                                                                                                                                                                                                                               |
| Xform Extract | decompose_xform_order | SRT           | Sets the preferred order of the output transformation operations when decomposing an imported matrix transform.                                                                                                                                                                                                                                                                                                                                                                                                                           |
|               | decompose_rot_order   | ZXY           | Sets the preferred order of the output rotation operations when decomposing an imported matrix transform.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| T             | translate_enable      | off           | When enabled, import the specified translation, rotation, and scale curves.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)          | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R                     | rotate_enable          | on            | When disabled, ignore the specified translation, rotation, and scale curves.                                                                                                                                                                                                                                                               |
| S                     | scale_enable           | on            |                                                                                                                                                                                                                                                                                                                                            |
| Rotation Euler Filter | euler_filter_enable    | off           | <p>When enabled, check for possible Euler flips in the decomposed rotation curves and remove them.</p> <p>The Euler filter can help to avoid discontinuity in rotations.</p>                                                                                                                                                               |
| Separate Parent       | parent_extract_enable  | on            | <p>When enabled, loading xform prim data inserts the prim's parent transform in the local-parent TRS controls.</p> <p>When disabled, the parent transform is combined with the prim's local transform and placed in the <b>Local Xform</b> TRS controls.</p>                                                                               |
| Local Parent Xform    |                        |               |                                                                                                                                                                                                                                                                                                                                            |
| Sync Local Parent     | sync_local_parent      | on            | <p>When enabled and <b>Import Scene Prim</b> is enabled, sync the <b>Local Parent Xform</b> controls to the imported scene prim data, <i>destructively</i> overwriting any user-assigned values.</p> <p>When disabled the <b>Local Parent Xform</b> controls are <i>not</i> overwritten and remain available for user-assigned values.</p> |
| Translate             | local_parent_translate | 0, 0, 0       | <p>Applies translation prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p> <p>When loading xform prim data from a scene file, the prim's parent transform can be placed here.</p>                  |
| Rotate                | local_parent_rotate    | 0, 0, 0       | <p>Applies rotation prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p>                                                                                                                            |

| Control (UI)                                                                        | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                    |               | When loading xform prim data from a scene file, the prim's parent transform can be placed here.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Scale                                                                               | local_parent_scale | 1, 1, 1       | <p>Applies scaling prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p> <p>When loading xform prim data from a scene file, the prim's parent transform can be placed here.</p>                                                                                                                                                                                                                                                                                                                        |
| Local Xform                                                                         |                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Sync Local Xform                                                                    | sync_local_xform   | on            | <p>When enabled and <b>Import Scene Prim</b> is enabled, sync the <b>Local Xform</b> controls to the imported scene prim data, <i>destructively</i> overwriting any user-assigned values.</p> <p>When disabled the <b>Local Xform</b> controls are <i>not</i> overwritten and remain available for user-assigned values.</p>                                                                                                                                                                                                                                                                                                                 |
|  | file_menu          | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu          | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object</li> </ul>                                                                                                                                                                                                                                                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>is snapped to a new position and orientation depending on the points selected.</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |



| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object’s position, scaling, skewing, and rotation, these occur from the location of the object’s origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation.<br><br>You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Specify Matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you’re transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                 |
| Matrix          | matrix           | N/A           | The matrix displays values from the object’s transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                                                                                                                              |
| World Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| World matrix    | world_matrix     | N/A           | Displays the world or absolute xyz transform of the node in world coordinates. <div> <b>Note:</b> Unlike the <b>Local matrix</b>, you can’t adjust the <b>World matrix</b> manually.</div>                                                                                                                                                                                                                                               |
| Display Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Display         | display          | wireframe     | Adjust the display characteristics of the 3D object. These settings don’t affect the render output of the scene; these are for display purposes only in the 3D Viewer. <ul style="list-style-type: none"><li>• <b>off</b> - hides the 3D geometry object.</li></ul>                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| Selectable   | selectable       | on            | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Editable     | editable         | on            | When enabled, you can edit points as normal in the Viewer. When disabled, points cannot be edited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# BasicSurface

This node creates a basic material that you can bind to a prim using the GeoBindMaterial node or the **img** input, if the prim has one. It combines the Diffuse, Specular, and Emission nodes, allowing you to control all three aspects of the material with a single node.



**Note:** To see the effect of your changes to an object's material properties, you need to have at least one light node in your Scene. You also need to enable transparency and lighting in the Viewer settings. Press **S** over the 3D Viewer, and check **transparency** and **headlamp** on the **3D** tab.



**Tip:** BasicSurface's classic 3D system equivalent is the [BasicMaterial](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | mapSh           | <p>An optional input for varying the shininess value. Where the mask is black, the shininess is set to the specified <b>min shininess</b> value. Where the mask is white, the shininess is set to the specified <b>max shininess</b> value. Values in between (where the matte is gray) are attenuated accordingly.</p> <div>  <b>Note:</b> This input is hidden on the left side of the node.         </div> |
|                 | mapS            | An optional input for limiting the effect of the specular component. Any changes you make to <b>specular</b> are limited to the non-black areas of the mask.                                                                                                                                                                                                                                                                                                                                   |
|                 | mapE            | An optional input for limiting the effect of the emissive component. Any changes you make to <b>emission</b> are limited to the non-black areas of the mask.                                                                                                                                                                                                                                                                                                                                   |
|                 | mapD            | An optional input for limiting the effect of the diffuse component. Any changes you make to <b>diffuse</b> are limited to the non-black areas of the mask.                                                                                                                                                                                                                                                                                                                                     |
|                 | unnamed         | Connects another shader node, such as ConstantShader or FillShader. Adding several shader nodes one after the other allows you to produce more complex effects.                                                                                                                                                                                                                                                                                                                                |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BasicSurface Tab |                  |               |                                                                                                                                                                                                       |
| channels         | channels         | rgb           | <p>The effect is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| emission      | emission         | 0             | Sets the color of the light the material emits. Note that when you have an image connected to the unnamed input of the BasicSurface node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the emission value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                   |
| diffuse       | diffuse          | 0.18          | Sets the color of the material when illuminated. Note that when you have an image connected to the unnamed input of the BasicSurface node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the diffuse value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                   |
| specular      | specular         | 0.8           | Sets how bright the highlights on the material seem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| min shininess | min_shininess    | 10            | <p>Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> <p>If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>max shininess</b> value is used as the shininess value for the material.</p> |
| max shininess | max_shininess    | 10            | <p>Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p>                                                                                                                                                                            |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>max shininess</b> value is used as the shininess value for the material.                                                                                                                                                                                                                                                                                                                                                                                                     |
| shininess channel | shininess_channel | luminance     | <p>Selects which channel from the <b>mapSh</b> input is used to map the black and white values to the <b>min shininess</b> and <b>max shininess</b> controls. Choose:</p> <ul style="list-style-type: none"> <li>• <b>red</b> - use the red channel for the mapping.</li> <li>• <b>green</b> - use the green channel.</li> <li>• <b>blue</b> - use the blue channel.</li> <li>• <b>alpha</b> - use the alpha channel.</li> <li>• <b>luminance</b> - use the luminance.</li> <li>• <b>average rgb</b> - use the average of the red, green, and blue channels.</li> </ul> |

# Camera

Cameras can be connected to either the GeoScene node or the ScanlineRender node. Camera connected to a ScanlineRender node define the projection for use by the 3D renderer. You can connect additional cameras to the GeoScene node and switch between them by choosing the viewing camera from the dropdown menu at the top of the Viewer. You can also read in **.fbx**, **.abc**, and **.usd** scene files containing standard cameras, though only one camera per Camera node can be read.

Cameras can also be used to project 2D textures onto 3D objects in a scene using the controls on the **Projection** tab and a Project3D node.



**Tip:** Camera's classic 3D system equivalent is the [Camera](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | <p>An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node.</p> <p>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</p> |
|                 | scene           | An optional input to import scene data.                                                                                                                                                                                                                                                                                                                         |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                        |
|-------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Camera Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                 |
| Import Scene Prim | import_enabled   | off           | <p>When disabled, the camera is configured using the controls under <b>Local Xform</b> on the <b>Camera</b> tab. Enable <b>Import Scene Prim</b> if you want to read in camera information from a file or from the scene graph.</p>                                                                                             |
| Import From       | import_source    | N/A           | <p>When Import Scene Prim is enabled, determines where the camera is loaded from:</p> <ul style="list-style-type: none"> <li>• <b>File Path</b> - a file on disk specified by the <b>File Path</b> control.</li> <li>• <b>Scene Input</b> - a scene graph location specified by the <b>Import Prim Path</b> control.</li> </ul> |
| Reload            | Reload           | N/A           | Click to reload the camera information from the specified file or scene graph location.                                                                                                                                                                                                                                         |

| Control (UI)     | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                     |               |  <b>Warning:</b> Any local changes you have made are overwritten by the imported camera data when you click <b>Reload</b> .                                                                                                                                                                                                                                                                           |
| File Path        | file                | none          | Sets the file path from which you intend to import camera information, if the <b>scene</b> input is not connected.                                                                                                                                                                                                                                                                                                                                                                     |
| Import Prim Path | import_prim_path    | none          | Sets the absolute scene graph path to the prim from which to import camera data.                                                                                                                                                                                                                                                                                                                                                                                                       |
| Output Prim Path | prim_path           | none          | <p>Sets the scene graph path for the new camera prim, such as <b>/Scene/Cameras/Camera1</b>.</p> <p>If the output path is left blank, the node name is used with a preceding <b>/</b> (forward slash). For example, <b>/Camera1</b>.</p>                                                                                                                                                                                                                                               |
| Parent Type      | parent_prim_type    | Xform         | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist.         </div>                                                                                                                                                             |
| Passthrough      | passthrough_enabled | off           | <p>When enabled, this node does not create output prims or affect the incoming scene file or scene graph.</p> <p>Any controls affecting output transforms still affect direct node connections, but those transforms are not output to prims in the output scene.</p> <p>A simple use case for passthrough might be importing a transform from an input prim and modifying or re-parenting the transform using the <b>axis</b> input or <b>Local Parent Xform</b> controls without</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                  |               | affecting the source prim.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Merge Input Scene | merge_enabled    | off           | <p>When enabled, the input scene is merged with this node's output scene.</p> <div>  <b>Note:</b> If the output prim path matches an existing path in the input scene, this node overwrites the existing prim. </div>                                                                                                                                                                                                                                    |
| Lock Read Frame   | lock_read_frame  | off           | <p>When enabled, only the frame specified in the <b>read_frame</b> control is read.</p> <p>When disabled, all frames are read.</p>                                                                                                                                                                                                                                                                                                                                                                                                        |
|                   | read_frame       | 0             | When <b>lock_read_frame</b> is enabled, specify the frame number to read or use the <b>read_frame</b> animation control to read any frame speed curve.                                                                                                                                                                                                                                                                                                                                                                                    |
| Lock Read View    | lock_read_view   | off           | <p>When enabled, only the view specified in the <b>read_view</b> control is read.</p> <p>When disabled, all views are read.</p>                                                                                                                                                                                                                                                                                                                                                                                                           |
|                   | read_view        | main          | When <b>lock_read_view</b> is enabled, specify the view to read.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Frame: Origin     | frame_origin     | 0             | <p>Sets the origin of the incoming frame range. Any frame rate change is scaled from this point allowing it to remain unchanged on the output frame slider.</p> <p>This can be very useful to keep an important frame in a time-warped range from shifting unexpectedly on the timeline. For example, if shot animation begins at frame 101, but there are some preroll keys at frames 50-100, then setting this control to 101 keeps that frame from changing when a frame rate change is applied, preserving the start of the shot.</p> |



| Control (UI)          | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                      |
|-----------------------|-----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rate                  | frame_rate            | 24            | <p>Sets the frame rate (frames per second) used to sample the geometry file.</p> <p>If this rate is lower than the rate encoded in the file, animation is slowed down. For example, if the file was animated at 24 fps and <b>Rate</b> is set to 12, the animation is read at half speed.</p> |
| Output Offset         | frame_offset          | 0             | <p>Offsets the incoming keyframes in time by the number of frames specified. The offset is applied after any frame rate change.</p> <p>The offset shifts the final, possibly time-warped keyframes in the frame slider.</p>                                                                   |
| Xform Extract         | decompose_xform_order | SRT           | Sets the preferred order of the output transformation operations when decomposing an imported matrix transform.                                                                                                                                                                               |
|                       | decompose_rot_order   | ZXY           | Sets the preferred order of the output rotation operations when decomposing an imported matrix transform.                                                                                                                                                                                     |
| T                     | translate_enable      | off           | <p>When enabled, import the specified translation, rotation, and scale curves.</p> <p>When disabled, ignore the specified translation, rotation, and scale curves.</p>                                                                                                                        |
| R                     | rotate_enable         | on            |                                                                                                                                                                                                                                                                                               |
| S                     | scale_enable          | on            |                                                                                                                                                                                                                                                                                               |
| Rotation Euler Filter | euler_filter_enable   | off           | <p>When enabled, check for possible Euler flips in the decomposed rotation curves and remove them.</p> <p>The Euler filter can help to avoid discontinuity in rotations.</p>                                                                                                                  |
| Separate Parent       | parent_extract_enable | on            | <p>When enabled, loading xform prim data inserts the prim's parent transform in the local-parent TRS controls.</p> <p>When disabled, the parent transform is combined with the prim's local transform and placed in the</p>                                                                   |

| Control (UI)       | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                   |
|--------------------|------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                        |               | <b>Local Xform</b> TRS controls.                                                                                                                                                                                                                                                                                                           |
| Local Parent Xform |                        |               |                                                                                                                                                                                                                                                                                                                                            |
| Sync Local Parent  | sync_local_parent      | on            | <p>When enabled and <b>Import Scene Prim</b> is enabled, sync the <b>Local Parent Xform</b> controls to the imported scene prim data, <i>destructively</i> overwriting any user-assigned values.</p> <p>When disabled the <b>Local Parent Xform</b> controls are <i>not</i> overwritten and remain available for user-assigned values.</p> |
| Translate          | local_parent_translate | 0, 0, 0       | <p>Applies translation prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p> <p>When loading xform prim data from a scene file, the prim's parent transform can be placed here.</p>                  |
| Rotate             | local_parent_rotate    | 0, 0, 0       | <p>Applies rotation prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p> <p>When loading xform prim data from a scene file, the prim's parent transform can be placed here.</p>                     |
| Scale              | local_parent_scale     | 1, 1, 1       | <p>Applies scaling prior to the local transform allowing a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order.</p> <p>When loading xform prim data from a scene file, the prim's parent transform can be placed here.</p>                      |
| Local Xform        |                        |               |                                                                                                                                                                                                                                                                                                                                            |
| Sync Local Xform   | sync_local_xform       | on            | When enabled and <b>Import Scene Prim</b> is enabled, sync the <b>Local Xform</b> controls to the imported                                                                                                                                                                                                                                 |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <p>scene prim data, <i>destructively</i> overwriting any user-assigned values.</p> <p>When disabled the <b>Local Xform</b> controls are <i>not</i> overwritten and remain available for user-assigned values.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                     |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b></li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>- the pivot point is snapped to a new position and orientation depending on the points selected.</p> <ul style="list-style-type: none"> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                            |
| Transform Order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                             |
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                           |
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                         |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                          |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                           |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                            |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                            |
| Pivot Translate | pivot_translate  | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                      |
| Pivot Rotate   | pivot_rotate     | 0, 0, 0       | Pivot Rotate                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Specify Matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                         |
| Matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                               |
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| World matrix   | world_matrix     | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                              |
| Display Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Display        | display          | wireframe     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> </ul> |

| Control (UI)           | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                    |               | <ul style="list-style-type: none"> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| Selectable             | selectable         | on            | When on, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                        |
| Editable               | editable           | on            | When on, you can edit points as normal in the Viewer. When disabled, points cannot be edited.                                                                                                                                                                                                                                                                                                                                                                                                         |
| Display At World Scale | gl_world_size-icon | off           | <p>When off, the camera representation in the Viewer scales with the scene so that it's always visible.</p> <p>When on, the camera representation in the Viewer is drawn at an approximate real world size and does not scale, so that the camera doesn't obscure other objects in the scene.</p>                                                                                                                                                                                                     |
| Projection Tab         |                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Projection             | project_mode       | perspective   | <p>Sets the camera projection type when projecting 2D textures:</p> <ul style="list-style-type: none"> <li>• <b>perspective</b> - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture.</li> <li>• <b>orthographic</b> - objects are viewed using parallel projection.</li> <li>• <b>uv</b> - every object renders its UV space into the output format. Use this to cook out texture maps.</li> </ul>                                          |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <ul style="list-style-type: none"> <li>• <b>spherical</b> - the entire 360° world is rendered as a spherical map.</li> </ul>                                                                                                                                                                                                                                                    |
| World to Meters     | world_to_meters  | 1             | <p>Sets the scale value to convert world-space units to meters for use in lens calculations to map into world-space units such as depth of field calculations.</p> <p>Lens parameters like <b>Focal Length</b> and <b>Horizontal Aperture</b> are defined in millimeters so this scale value is further divided by 1000 to get the final world-scale to millimeters scalar.</p> |
| Focal Length        | focal            | 50            | <p>Sets the distance (in mm) between the lens and the point where the rays converge after having been refracted by the lens. Together with the <b>Horizontal Aperture</b> value, this determines the field of view angle.</p> <p>Shorter focal lengths increase the field of view angle, capturing more of a given scene.</p>                                                   |
| Horizontal Aperture | haperture        | 24.576        | Sets the an equivalent width (in mm) to the film negative in a real camera.                                                                                                                                                                                                                                                                                                     |
| Vertical Aperture   | vaperture        | 18.672        | Sets the an equivalent height (in mm) to the film negative in a real camera.                                                                                                                                                                                                                                                                                                    |
| Near                | near             | 0.1           | <p>Adjusts the position, in scene units, of the camera's near clipping plane. Objects closer to the camera than this plane are not rendered.</p> <div>  <b>Note:</b> The value for the <b>Near</b> clipping plane must always be positive to produce a sensible result. </div>               |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Far                 | far              | 10000         | Adjusts the position, in scene units, of the camera's far clipping plane. Objects farther from the camera than this plane are not rendered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Window Translate uv | win_translate    | 0, 0          | Changes the position of the film negative without changing the position of the camera itself, providing unique perspective views not otherwise possible. The value is in the range [-1,1] and it's relative to the film size.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Window Scale uv     | win_scale        | 1, 1          | Scales the film negative.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Window Roll         | winroll          | 0             | Rotates the film negative (by degrees) without changing the camera axis rotation itself.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Focal Distance      | focal_point      | 2             | Sets the distance in scene units from the camera center at which the image is perfectly in focus. Only applies to depth of field rendering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Fstop               | fstop            | 16            | As in real world camera, fstop controls the amount of light that can reach the film negative. Only applies to depth of field rendering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shutter             | shutter          | 0.5           | Sets how long the shutter should be open for when blurring motion. The value is in frames, so 0.5 is half a frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Shutter Offset      | shutteroffset    | start         | Controls how the shutter behaves with respect to the current frame value. It has four options: <ul style="list-style-type: none"> <li>• <b>centred</b> - centers the shutter around the frame. That is, open from <math>f - \text{shutter}/2</math> to <math>f + \text{shutter}/2</math>.</li> <li>• <b>start</b> - opens the shutter starting at the frame. That is, open from <math>f</math> to <math>f + \text{shutter}</math>.</li> <li>• <b>end</b> - closes the shutter at the frame. That is, open from <math>f - \text{shutter}</math> to <math>f</math>.</li> <li>• <b>custom</b> - opens the shutter at the time specified by the <b>shuttercustomoffset</b> control.</li> </ul> |



| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                      |
|--------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | shuttercustomoffset | 0             | <p>When <b>shutteroffset</b> is set to <b>custom</b>, this controls the time that the shutter opens by adding it to the current frame.</p> <p>Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p> |
| Bias         | shutter_bias        | 0             | Biases samples toward shutter close or shutter open for stylized motion blur. 0+ range (where 0 is uniform blur).                                                                                                                             |

# CameraTracker

CameraTracker (NukeX and Nuke Studio only) is designed to provide an integrated camera tracking or matchmoving tool, allowing you to create a virtual camera whose movement matches that of your original camera. Tracking camera movement in a 2D footage enables you to add virtual 3D objects to your 2D footage.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                  |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Source          | The sequence whose camera movement you want to track.                                                                                                                                                     |
|                 | Mask            | <p>An optional input to use as a mask. By default, feature tracking is limited to the non-black areas of the mask.</p> <p>The <b>Mask</b> input is hidden until the <b>Source</b> input is connected.</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CameraTracker Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Input             |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Source            | sourceType       | Sequence      | <p>Sets the type of source footage you intend to track:</p> <ul style="list-style-type: none"> <li>• <b>Sequence</b> - designed to track a contiguous frame sequence with minimal intervention from you.</li> <li>• <b>Stills</b> - creates a camera track from reference frame stills taken on site. These represent the minimum number of frames required to cover your subject with sufficient overlap.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Mask              | ignore           | None          | <p>Set the mask type to exclude areas of the sequence when tracking:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the Mask input to define which areas to ignore.</li> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the Mask input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the Mask input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted Mask input alpha channel to define which areas to ignore.</li> </ul> |
| Range             | trackRange       | Input         | <p>Sets the range of frames processed by CameraTracker:</p> <ul style="list-style-type: none"> <li>• <b>Input</b> - the default value, sets the frame</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)                                                                        | Knob (Scripting)  | Default Value                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|-------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                   |                                          | <p>range to the length of the sequence attached to the Source input.</p> <ul style="list-style-type: none"> <li>• <b>Global</b> - sets the tracking frame range to the range set in the <b>Project Settings &gt; frame range</b> controls. If no frame range is defined, the frame range of the first image you read in is used as the Global frame range.</li> <li>• <b>Custom</b> - sets a tracking range of frames described by the <b>from</b> and <b>to</b> fields.</li> <li>• <b>Reference Frames</b> - allows you to manually define keyframes in the sequence using the +/- buttons. You can also add keyframes to all frames or a specific frame range using the <b>Add</b> dropdown. This option should only be used if you have set <b>Source</b> to <b>Stills</b>.</li> </ul> |
| from                                                                                | trackStart        | Dependent on the <b>Project Settings</b> | When <b>Range</b> is set to <b>Custom</b> , this control sets the first frame to track in the footage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| to                                                                                  | trackStop         | Dependent on the <b>Project Settings</b> | When <b>Range</b> is set to <b>Custom</b> , this control sets the last frame to track in the footage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Frames                                                                              | referenceFrames   | 0                                        | <p>Displays the reference frames to track and solve.</p> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|  | addReferenceFrame | N/A                                      | Adds the current frame to the set of frames to track and solve.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)                                                                      | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|----------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                            |               |  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b> .                                                                                                                                                                                                                                                                                                                                           |
|  | deleteReferenceFrame       | N/A           | <p>Removes the current frame from the set of frames to track and solve.</p><br> <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b> .                                                                                                                                                                                                                                                            |
| Add                                                                               | addReference-FramesMenu    | Add           | <p>Allows you to quickly add reference frames:</p> <ul style="list-style-type: none"> <li>• <b>Add All</b> - Adds all frames based on the input's start and end range. Any missing frames on the input clip are skipped.</li> <li>• <b>Add Range</b> - Opens a dialog that lets you select a specific frame range to add.</li> </ul><br> <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b> . |
| Delete                                                                            | deleteReference-FramesMenu | Delete        | <p>Allows you to quickly remove reference frames:</p> <ul style="list-style-type: none"> <li>• <b>Delete All</b> - Removes all reference frames.</li> <li>• <b>Delete Range</b> - Opens a dialog that lets you select a specific frame range to remove.</li> </ul><br> <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b> .                                                                   |
| Camera                                                                            |                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)    | Knob (Scripting)       | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Principal View  | principalView          | left               | <p>Sets the principal view where features are tracked and the <b>Mask</b> input is applied. The secondary camera is calculated relative to this <b>Principal View</b> camera.</p> <p>This control also appears on the <b>Settings</b> tab.</p> <div>  <p><b>Note:</b> Principal View is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p> </div>       |
| Camera Motion   | cameraMotionLink       | Free Camera        | <p>Sets the type of camera motion to compensate for:</p> <ul style="list-style-type: none"> <li>• <b>Rotation Only</b> - select this if the camera is stationary, but rotating.</li> <li>• <b>Free Camera</b> - select this if the camera is moving freely, rotating, and translating.</li> <li>• <b>Linear Motion</b> - select this if the camera motion is a straight, linear path.</li> <li>• <b>Planar Motion</b> - select this if the camera has a flat path, moving in a two-dimensional plane only.</li> </ul>                    |
| Lens Distortion | lensDistortionTypeLink | No Lens Distortion | <p>Specifies the type of lens distortion expected:</p> <ul style="list-style-type: none"> <li>• <b>No Lens Distortion</b> - treats the footage as having no distortion. Use this option if the <b>Source</b> footage has already been corrected to remove lens distortion.</li> <li>• <b>Unknown Lens</b> - calculates the lens distortion automatically from the sequence (in the same way as the Image <b>Analysis</b> tab in the <a href="#">LensDistortion</a> node) and then refines the distortion in the camera solve.</li> </ul> |

| Control (UI)     | Knob (Scripting)    | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|---------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Undistort Input  | undistort           | off              | When enabled, the <b>Source</b> is undistorted based on the calculated lens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Focal Length     | focalLengthType     | Unknown Constant | <p>Sets the focal length for the camera:</p> <ul style="list-style-type: none"> <li>• <b>Known</b> - select this option if the focal length is available and enter a value in the <b>Length</b> control.</li> <li>• <b>Approximate Varying</b> - select this option if an approximate focal length is available and enter keyframed focal length values in the <b>Length</b> control.</li> <li>• <b>Approximate Constant</b> - select this option if an approximate focal length is available and there is no zoom, and enter a focal length value in the <b>Length</b> control.</li> </ul> <div>  <p><b>Note:</b> CameraTracker attempts to refine the focal length during the solve if you select an <b>Approximate</b> option.</p> </div> <ul style="list-style-type: none"> <li>• <b>Unknown Varying</b> - select this option if the focal length is unknown and changing.</li> <li>• <b>Unknown Constant</b> - this is the default option. Use this option if the focal length is unknown and there is no zoom.</li> </ul> |
| Length           | knownFocalLength    | 50               | Sets the focal length for approximate and known solves. You can animate this control to define a varying focal length. The units are the same as those used for the <b>Film Back Size</b> (mm or inches).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Film Back Preset | filmBackSizePresets | Custom           | Sets the <b>Film Back Size</b> controls automatically, depending on which preset you choose.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                         |
|----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <p>The default setting allows you to enter your own settings manually.</p> <div>  <b>Tip:</b> You can add your own defaults by editing the <b>../NukeScripts/camerapresets.py</b> file in the Nuke installation package. </div> |
| Film Back Size<br>xy | filmBackSize     | 36,24         | Sets the size of the camera imaging sensor. Specify the units you want to use by selecting either millimeters or inches in the <b>Units</b> dropdown. The units should match the units used for the <b>Length</b> .                                                                                              |
| Units                | filmbackUnits    | mm            | Sets the unit of measure for the <b>Film Back Size</b> , either millimeters or inches.                                                                                                                                                                                                                           |
| Analysis             |                  |               |                                                                                                                                                                                                                                                                                                                  |
| Track                | trackFeatures    | N/A           | Click to begin auto-tracking using the controls specified in the <b>Settings</b> tab. Track defines a set of 2D feature tracks that correspond to fixed points, or features, in the scene.                                                                                                                       |
| Update Track         | updateTrack      | N/A           | Click to display a frame range dialog, allowing you to retrack part of the sequence, such as when you have extended the frame range or used some of the <b>Settings</b> tab <b>Tracking</b> refinement controls.                                                                                                 |
| Clear Tracks         | clearTrack       | N/A           | Click to clear all auto-tracking data. A confirmation message needs acknowledging before the action is completed.                                                                                                                                                                                                |
| Solve                | solveCamera      | N/A           | Click to begin calculating the solve using the controls specified in the <b>Settings</b> tab. Solve calculates the camera path and projection                                                                                                                                                                    |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | creating a 3D point for each 2D feature track within a minimum projection error, including auto-tracks, User Tracks, and tracks created from imported Trackers.                                                                                                                                                                                                                                   |
| Update Solve  | updateSolve      | N/A           | <p>Click to update the solve calculation, such as when you have extended the frame range or used some of the <b>Settings</b> tab <b>Solving</b> refinement controls.</p> <p>Recalculating the solve is handy when you want to see how good the solve is after you've refined it, without permanently deleting tracks. Recalculating the solve also recalculates stereo geometry.</p>              |
| Clear Solve   | resetSolve       | N/A           | Click to clear all solve data. A confirmation message needs acknowledging before the action is completed.                                                                                                                                                                                                                                                                                         |
| Error         | solveRMSE        | N/A           | Displays the RMS (root mean square) error of your solve, in pixels. As a general rule of thumb, if your solve reports an RMS projection rate higher than 1.0 pixel, you may want to consider fine-tuning your solve or tracking data.                                                                                                                                                             |
| per frame     | solveError       | N/A           | Displays the RMS (root mean square) error of your solve at each frame, in pixels.                                                                                                                                                                                                                                                                                                                 |
| Export        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                   |
| [export menu] | exportMenu       | Camera        | <p>Determines how the track and solve data is used when you click Create:</p> <ul style="list-style-type: none"> <li>• <b>Camera</b> - creates a single animated camera.</li> <li>• <b>Camera rig</b> - creates an animated camera for each view in the script and a JoinViews to node to pass the animation downstream.</li> <li>• <b>Scene</b> - creates a single animated camera, a</li> </ul> |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>point cloud from the solved 3D points, and a Scene node.</p> <ul style="list-style-type: none"> <li>• <b>Scene+</b> - creates a scene containing all the components included in the other create modes.</li> <li>• <b>Point cloud</b> - creates a point cloud from the solved 3D points.</li> <li>• <b>Distortion</b> - creates a LensDistortion node with <b>Undistort</b> disabled.</li> <li>• <b>Undistortion</b> - creates a LensDistortion node with <b>Undistort</b> enabled.</li> <li>• <b>Cards</b> - creates a 3D card for each solved frame in the sequence.</li> </ul> <div>  <b>Note:</b> Creating Cards from sequences can take long time, depending on the number of frames present. </div> |
| Create       | exportButton     | N/A           | Click to create the option specified in the export dropdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Link output  | linkOutput       | on            | <p>When enabled, cameras and points are updated when the solve is updated.</p> <p>If you disable linking, the expression link between the CameraTracker and Camera nodes is disconnected.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| New 3D       | new3D            | on            | <p>Sets the 3D system with which the <b>Export</b> nodes are compatible:</p> <p>When enabled, clicking the <b>Create</b> button adds the selected new 3D system nodes to the Node Graph. New 3D system nodes are red by default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)        | Knob (Scripting)    | Default Value                            | Function                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|---------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                     |                                          | When disabled, clicking the <b>Create</b> button adds the selected classic 3D system nodes to the Node Graph. Classic 3D system nodes are green by default.                                                                                                                                                                                                                |
| UserTracks Tab      |                     |                                          |                                                                                                                                                                                                                                                                                                                                                                            |
| User Track Views    | userTrackViews      | Dependent on the <b>Project Settings</b> | <p>You can only set up User Tracks in a maximum of two views. This control allows you to select which views correspond with the left (lx, ly) and right (rx, ry) 2D User Track location columns.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p> |
| [user tracks table] | userTracks          | N/A                                      | Displays positional information for any User Tracks in the script.                                                                                                                                                                                                                                                                                                         |
| Add Track           | addUserTrack        | N/A                                      | Click to add a User Track in the center of the Viewer.                                                                                                                                                                                                                                                                                                                     |
| Delete Tracks       | deleteUserTracks    | N/A                                      | Click to delete the current selections in the tracks list.                                                                                                                                                                                                                                                                                                                 |
| Autotrack           | autotrackUserTracks | N/A                                      | Click to begin auto-tracking the current selections in the tracks list.                                                                                                                                                                                                                                                                                                    |
| Update XYZ          | updateUserTrackXYZ  | N/A                                      | Click to recalculate the XYZ coordinates of the current selections in the tracks list.                                                                                                                                                                                                                                                                                     |
| Import Tracks       | importUserTracks    | N/A                                      | Click to import previously exported User Tracks.                                                                                                                                                                                                                                                                                                                           |
| Export Tracks       | exportUserTracks    | N/A                                      | Click to export the current selections in the tracks list.                                                                                                                                                                                                                                                                                                                 |
| Import Tracker      | importTracker       | N/A                                      | Click to import track information from a Tracker node within the script.                                                                                                                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Export Tracker | exportTracker    | N/A                                      | Click to export the current selections in the tracks list to a Tracker node within the script.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| AutoTracks Tab |                  |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Solve Error    | SolveRMSE        | N/A                                      | Displays the RMS (root mean square) error of your solve, in pixels. As a general rule of thumb, if your solve reports an RMS projection rate higher than 1.0 pixel, you may want to consider fine-tuning your solve or tracking data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| per frame      | solveError       | N/A                                      | Displays the RMS (root mean square) error of your solve at each frame, in pixels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Curves View    | curvesView       | Dependent on the <b>Project Settings</b> | <p>Sets the view for the track curves.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| [track curves] | trackCurves      | N/A                                      | <p>Displays the following track and solve information in the form of curves:</p> <ul style="list-style-type: none"> <li>• <b>num tracks</b> - the number of tracked features at each frame.</li> <li>• <b>track len - min</b> - the minimum length of the tracks at each frame (in frames).</li> <li>• <b>track len - avg</b> - the average length of the tracks at each frame (in frames).</li> <li>• <b>track len - max</b> - the maximum length of the tracks at each frame (in frames).</li> <li>• <b>Min Length</b> - the threshold for minimum track length. You can adjust the minimum using the Min Length control.</li> <li>• <b>Solve Error</b> - displays the constant Solve Error parameter.</li> <li>• <b>error min</b> - the minimum reprojection error</li> </ul> |

| Control (UI)    | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|--------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                    |               | <p>at each frame (in pixels).</p> <ul style="list-style-type: none"> <li>• <b>error rms</b> - the root mean reprojection error at each frame (in pixels).</li> <li>• <b>error track</b> - the maximum root mean reprojection error calculated over the track lifetime at each frame (in pixels).</li> <li>• <b>error max</b> - the maximum reprojection error at each frame (in pixels).</li> <li>• <b>Max Track Error</b> - displays the constant Max RMS Error parameter. You can adjust the maximum using the <b>Max Track Error</b> control.</li> <li>• <b>Max Error</b> - displays the Max Error threshold parameter. You can adjust the maximum using the <b>Max Error</b> control.</li> </ul> |
| Min Length      | minLengthThreshold | 0             | <p>Redefines your thresholds if you find your solve or camera output needs adjusting:</p> <ul style="list-style-type: none"> <li>• <b>Min Length</b> - increase the minimum length threshold to reject short tracks. You might find a lot of short tracks cropping up in long sequences with a slow camera movement.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                      |
| Max Track Error | maxRMSEThreshold   | 0             | <ul style="list-style-type: none"> <li>• <b>Max Track Error</b> - reduce this threshold to reject tracks based on RMS reprojection error.</li> <li>• <b>Max Error</b> - reduce this threshold to reject tracks with a large reprojection error in isolated frames.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Max Error       | maxErrorThreshold  | 0             | <div>  <p><b>Note:</b> Feature tracks that fall within the threshold limits are called inliers, and are used when you recalculate a solve instead of starting from scratch.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)        | Knob (Scripting)     | Default Value | Function                                                                                                                                                                               |
|---------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Refinement          |                      |               |                                                                                                                                                                                        |
| Refine Solve        | refineSolve          | N/A           | Click to attempt to refine the solve calculation using the methods outlined in the <b>Focal Length</b> , <b>Position</b> , and <b>Rotation</b> controls.                               |
| Focal Length        | refineOptions        | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated <b>Focal Length</b> .                                                 |
| Position            | refineOptions        | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated camera position.                                                      |
| Rotation            | refineOptions        | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated camera orientation.                                                   |
| Delete Unsolved     | deleteInvalidTracks  | N/A           | Click to permanently delete tracks for which 3D points could not be calculated in the solve.                                                                                           |
| Delete Rejected     | deleteRejectedTracks | N/A           | Click to delete any tracks rejected by the threshold controls.                                                                                                                         |
| Delete Auto-tracks  | deleteAutoTracks     | N/A           | Click to delete all auto-tracks from the script, while retaining User Track and solve data. You can use this button to reduce the size of the script once you're happy with the solve. |
| Settings Tab        |                      |               |                                                                                                                                                                                        |
| Features            |                      |               |                                                                                                                                                                                        |
| Number of Features  | numberFeatures       | 150           | Sets the number of features to track in each frame - ideally you should use more than 100 tracks per frame.                                                                            |
| Detection Threshold | featureThreshold     | 0.1           | Sets the distribution of features over the input image. Low values track features evenly on all parts of the image.                                                                    |

| Control (UI)             | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                 |
|--------------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feature Separation       | featureSpearation    | 12            | Sets the distribution of features in relation to each other. High values spread features at even distances over the image.                                                                               |
| Refine Feature Locations | refineFeatures       | off           | When enabled, lock detected features to local corners. CameraTracker finds the closest corner point in your footage and locks feature points to them.                                                    |
| Preview Features         | previewFeatures      | off           | When enabled, preview the potential features available for tracking. This allows you to check that the features cover the image. If not, tweak the tracking controls before tracking.                    |
| Tracking                 |                      |               |                                                                                                                                                                                                          |
| Minimum Length           | minTrackLength       | 3             | Sets a threshold value for the minimum track length to reject short tracks. You might find a lot of short tracks cropping up in long sequences with a slow camera movement.                              |
| Track Threshold          | matchThreshold       | 0.69999999    | Controls how similar features look over a number of frames. You can adjust this value to test whether a track is reliable.                                                                               |
| Track Smoothness         | smoothnessThreshold  | 0.1           | Sets the threshold for smooth track generation. Adjusting this value can be useful in preventing poor tracks in complex sequences. Increase the smoothness value to remove tracks that glitch over time. |
| Track Consistency        | consistencyThreshold | 0             | Sets the threshold for consistent track generation. Increase this value to ensure track motion is locally consistent. Adjust consistency to prevent poor tracks in complex sequences.                    |
| Solving                  |                      |               |                                                                                                                                                                                                          |
| Principal View           | principalView        | left          | Sets the principal view where features are                                                                                                                                                               |

| Control (UI)     | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|--------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                    |               | <p>tracked and the <b>Mask</b> input is applied. The secondary camera is calculated relative to this <b>Principal View</b> camera.</p> <p>This control also appears on the <b>CameraTracker</b> tab.</p> <div>  <p><b>Note:</b> Principal View is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p> </div>                          |
| Camera Motion    | cameraMotion       | Free Camera   | <p>Sets the type of camera motion to compensate for:</p> <ul style="list-style-type: none"> <li>• <b>Rotation Only</b> - select this if the camera is stationary, but rotating.</li> <li>• <b>Free Camera</b> - select this if the camera is moving freely, rotating, and translating.</li> <li>• <b>Linear Motion</b> - select this if the camera motion is a straight, linear path.</li> <li>• <b>Planar Motion</b> - select this if the camera has a flat path, moving in a two-dimensional plane only.</li> </ul> |
| Keyframe Spacing | keyFrameSeparation | 0.30000001    | Controls the separation between keyframes. Use a high separation to spread keyframes out in long sequences with small camera movements. Use a low separation to generate more keyframes for fast camera moves.                                                                                                                                                                                                                                                                                                        |
| Smoothness       | motionSmoothness   | 0             | Adjusts the smoothness of your camera path. Increase this value to add weighting to the camera path and create a smoother result.                                                                                                                                                                                                                                                                                                                                                                                     |
| Reference Frame  | rootReferenceFrame | 0             | When <b>Set reference frame</b> is enabled, specifies the first frame to use as a keyframe                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)                                                                                                                                                          | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                       |                                |               | in the solve. This should be a frame where there is a large number of tracks distributed over the image with a good variation in depth.                                                                                                                   |
| Set reference frame                                                                                                                                                   | setRootFrame                   | off           | When enabled, use the Reference Frame field to manually define how keyframes are specified in the sequence. This can be useful if you have a difficult sequence to solve.                                                                                 |
| Stereo (These controls are only displayed if you have set up more than one view in your <b>Project Settings</b> , typically when working on a stereoscopic projects.) |                                |               |                                                                                                                                                                                                                                                           |
| Aligned Stereo Cameras                                                                                                                                                | alignSecondary Cameras         | on            | When enabled, the solve aligns secondary cameras to the principal camera position.                                                                                                                                                                        |
| Constant Interaxial Distance                                                                                                                                          | constantInterAxial Distance    | on            | When enabled, a constant interaxial distance is maintained between views.                                                                                                                                                                                 |
| Interaxial Distance                                                                                                                                                   | interAxialDistance             | 1             | <p>Sets a known interaxial distance for stereo views to define the scene scale.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p> |
| Constant Interaxial Coverage                                                                                                                                          | constantInterAxial Convergence | on            | When enabled, a constant interaxial convergence is maintained between views.                                                                                                                                                                              |
| Display                                                                                                                                                               |                                |               |                                                                                                                                                                                                                                                           |
| Show tracks                                                                                                                                                           | displayTracks                  | on            | When enabled, the individual tracks generated during analysis are displayed in the Viewer.                                                                                                                                                                |
| Show projected 3D point                                                                                                                                               | displayReprojected             | on            | When enabled, circular highlights are displayed around the reprojected points in the 2D Viewer. Hover over points to display                                                                                                                              |



| Control (UI)                                                                        | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                        |               | track length and reprojection error information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Show key tracks only                                                                | keyframePointsOnly     | off           | When enabled, only the longest tracks used to calculate the solve are displayed in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Show 3D marker                                                                      | displayMarker          | off           | When enabled, cone shaped 3D markers are displayed on your points in the 3D Viewer. <div>  <b>Note:</b> When <b>Show 3D marker</b> is enabled, set the size of the markers using the scale controls. </div>                                                                                                                                                                                                                                                                                                                                                             |
| Scene Tab                                                                           |                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| [scale constraints table]                                                           | scaleConstraints       | N/A           | Displays known distances for scale constraints against a measured distance between two solved points in the scene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Delete Constraints                                                                  | deleteScaleConstraints | N/A           | Click to delete the selected scale constraints.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Scene Transform                                                                     |                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|  | file_menu              | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the scene is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the scene is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the scene is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                |
| translate xyz                                                                     | translate        | 0,0,0         | Translates the scene along the x, y, and z axes. You can also adjust translate values by clicking and dragging the handles in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                      |
| rotate xyz                                                                        | rotate           | 0,0,0         | Rotates the scene around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                        |
| scale xyz                                                                         | scale            | 0,0,0         | <p>Scales the scene around the x, y, and z axes. You can adjust scale values by holding down <b>Ctrl/Cmd+Shift</b> and dragging in the 3D Viewer.</p> <div>  </div> <p><b>Note:</b> This control is only displayed if you've scaled the scene on individual axes.</p>                                                                                            |
| uniform scale                                                                     | uniform_scale    | 1             | Scales the scene simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)          | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                              |
|-----------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local matrix          |                     |               |                                                                                                                                                                                                                                                                                       |
| specify matrix        | useMatrix           | off           | When enabled, specify matrix values for the object you're transforming as an alternative to setting transform and scale values above.                                                                                                                                                 |
| [matrix]              | local_matrix        | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |
| World matrix          |                     |               |                                                                                                                                                                                                                                                                                       |
| [matrix]              | world_matrix        | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> You can't adjust the <b>World matrix</b> manually. </div>                                |
| Reset Scene Transform | resetSceneTransform | N/A           | Click to reset any transforms applied to the scene to the default value.                                                                                                                                                                                                              |
| Output Tab            |                     |               |                                                                                                                                                                                                                                                                                       |
| Camera                |                     |               |                                                                                                                                                                                                                                                                                       |
| Translate xyz         | camTranslate        | 0,0,0         | Sets the translate values for the virtual camera's position.                                                                                                                                                                                                                          |
| Rotate xyz            | camRotate           | 0,0,0         | Sets the rotation values for the virtual camera's position.                                                                                                                                                                                                                           |
| Focal Length          | focalLength         | 0             | Sets the focal length for the virtual camera.                                                                                                                                                                                                                                         |
| Aperture xy           | aperture            | 0,0           | Sets the aperture angle for the virtual camera.                                                                                                                                                                                                                                       |
| Window                | windowTranslate     | 0,0           | Sets the center point offset for the camera                                                                                                                                                                                                                                           |

| Control (UI)            | Knob (Scripting)     | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|----------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Translate xy            |                      |                    | projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Window Scale xy         | windowScale          | 0,0                | Sets the relative pixel scaling value for the camera projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Lens                    |                      |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Lens Distortion         | lensDistortionType   | No Lens Distortion | Specifies the type of lens distortion expected: <ul style="list-style-type: none"> <li>• <b>No Lens Distortion</b> - treats the footage as having no distortion. Use this option if the <b>Source</b> footage has already been corrected to remove lens distortion.</li> <li>• <b>Unknown Lens</b> - calculates the lens distortion automatically from the sequence (in the same way as the Image <b>Analysis</b> tab in the <a href="#">LensDistortion</a> node) and then refines the distortion in the camera solve.</li> </ul> |
| Lens Type               | lensType             | Spherical          | Sets the lens type that CameraTracker should expect: <b>Spherical</b> or <b>Anamorphic</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Radial Distortion 1     | distortion1          | 0                  | Sets the first radial distortion term. This is proportional to $r^2$ , where $r$ is the distance from the distortion center.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Radial Distortion 2     | distortion2          | 0                  | Sets the second radial distortion term, proportional to $r^4$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Distortion Center xy    | distortionCenter     | 0,0                | Sets the values for the center of the radial distortion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Anamorphic Squeeze      | anamorphicSqueeze    | 1                  | When <b>Lens Type</b> is set to <b>Anamorphic</b> , defines anamorphic squeeze - the distortion in x is scaled by this amount.                                                                                                                                                                                                                                                                                                                                                                                                    |
| Asymmetry Distortion xy | asymmetricDistortion | 0,0                | When <b>Lens Type</b> is set to <b>Anamorphic</b> , defines asymmetric distortion to correct for slight misalignments between multiple elements in the lens.                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Undistort Input | undistort        | off           | When enabled, the <b>Source</b> is undistorted based on the calculated lens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| filter          | filter           | Cubic         | <p>When <b>Undistort Input</b> is enabled, sets the filtering algorithm to used. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moiré patterns).</li> </ul> |

Card Parameters

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scale xyz    | cardScale        | 1,1,1         | Equivalent value for the <b>scale</b> parameter on the <b>Card</b> node, used to produce horizontal scale in conjunction with the <b>Radial Distortion</b> controls.                                                                                                                                                                                                                                                                                                              |
| a (r^3)      | a                | 0             | <p>Equivalent value for the <b>a (r^3)</b> control on <b>LensDistortion</b> tab of the <b>Card</b> node. Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion.</p> <p>Positive values make the card rounder, negative make the corners sharper.</p>  |
| b (r^2)      | b                | 0             | <p>Equivalent value for the <b>b (r^2)</b> control on <b>LensDistortion</b> tab of the <b>Card</b> node. Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion.</p> <p>Positive values make the card rounder, negative make the corners sharper.</p> |
| c (r^1)      | c                | 0             | <p>Equivalent value for the <b>c (r^1)</b> control on <b>LensDistortion</b> tab of the <b>Card</b> node. Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected</p>                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                      |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion</p> <p>Positive values make the card rounder, negative make the corners sharper.</p> |

# ConstantShader

The ConstantShader node is used to apply a material with constant color to a prim. ConstantShader has no inputs.

## Inputs and Controls

| Control (UI)       | Knob (Scripting) | Default Value | Function                                              |
|--------------------|------------------|---------------|-------------------------------------------------------|
| ConstantShader Tab |                  |               |                                                       |
| Color              | color            | 1             | Sets the color of the material applied to the prim.   |
| Opacity            | opacity          | 1             | Sets the opacity of the material applied to the prim. |

# DepthGenerator

The DepthGenerator node (NukeX and Nuke Studio only) allows you to generate a depth map from your footage. The node uses information from a tracked camera to create a channel that displays variations in depth.

A depth map is an image that uses the brightness of each pixel to specify the distance between the 3D scene point and the virtual camera used to capture the scene.

DepthGenerator also allows you to output depth as normals and position passes, and create a [Card3D](#) node positioned in 3D space and displaced according to the depth channel.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Mask            | <p>The mask used to ignore areas of the source image. DepthGenerator expects alpha values of either 0 (for regions to use) or 1 (for regions to ignore).</p> <p>Depth can only be calculated where the real world 3D position of objects doesn't change. If there are moving objects in your <b>Source</b> footage, DepthGenerator is likely to struggle to create an accurate depth map for those regions. To prevent this, you can exclude moving foreground regions from the depth calculation by connecting a matte to this input and setting <b>Ignore Mask</b> in the DepthGenerator properties to the channel that contains the matte.</p> <p>The <b>Mask</b> input only appears once you've connected the other two inputs.</p> |
|                 | Camera          | A tracked Camera that matches the Source footage. If necessary, you can create one using the <a href="#">CameraTracker</a> node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                 | Source          | The source footage from which the Camera track was derived.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DepthGenerator Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Ignore Mask        | ignoreMask       | None          | <p>Sets the mask type to exclude areas of the <b>Source</b> footage during depth calculation. DepthGenerator expects values of either 0 (for regions to use) or 1 (for regions to ignore).</p> <p>Depth can only be calculated where the real world 3D position does not change. If your <b>Source</b> footage includes moving foreground objects, it's a good idea to supply a mask to prevent distortion in moving regions:</p> |





| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the <b>Source</b> clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the <b>Source</b> clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the <b>Mask</b> input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted <b>Mask</b> input alpha channel to define which areas to ignore.</li> </ul> <p>Alternatively, you can try using a smaller <b>Frame Separation</b> to capture moving objects.</p> |
| Output        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Depth Output  | outputType       | Depth (1/Z)   | <p>Sets the type of output produced:</p> <ul style="list-style-type: none"> <li>• <b>Depth 1/Z</b> - output 1/Z where Z is the distance along the camera Z axis. This matches the depth output of the <a href="#">ScanlineRender</a> node.</li> <li>• <b>Distance</b> - output the distance along the ray from the camera center to the 3D surface point.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Create Card   | createCard       | N/A           | <p>Click to create a group containing a displaced Card to visualize depth as a surface in 3D space.</p> <div>  <b>Note:</b> The <b>DepthOutput</b> control must be set to <b>Depth (1/Z)</b>.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Surface Point | P_channel        | none          | Sets the channel(s) to output depth as a position pass.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | The position pass includes the X, Y, and Z coordinates for each pixel in the image. You can use it with the <a href="#">Relight</a> node, or with the <a href="#">PositionToPoints</a> node to visualize depth as a 3D point cloud.                                                                                                                                                                                                                                 |
| Surface Normal   | N_channel        | none          | <p>Sets the channel(s) to output depth as a normals pass. Use the <b>NormalDetail</b> control to affect the smoothness of the normals pass.</p> <p>The normals pass contains three vectors of information for each pixel in the image: X direction, Y direction, and Z direction. In other words, it stores the direction in which each point in the image is facing. You can use a normals pass with the <a href="#">Relight</a> node.</p>                         |
| Frame Separation |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Analyze Sequence | analyzeSequence  | N/A           | <p>Click to automatically calculate the <b>FrameSeparation</b> to use in the sequence.</p> <p>For this to work, the camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p> <div>  <b>Note:</b> If you analyze the sequence and only then decide to add an ignore mask, you should analyze the sequence again after adding the mask. </div> |
| Analyze Frame    | analyzeFrame     | N/A           | <p>Click to calculate the <b>Frame Separation</b> to use at the playhead frame.</p> <p>This gives you more control than <b>Analyze Sequence</b>, as you can work through the timeline, analyze particular frames, and if necessary tweak the <b>Frame Separation</b> value manually.</p> <p>The camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p>                                                                        |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frame Separation    | frameSeparation  | 1             | <p>Adjusts the offset between the current frame and the frame against which to calculate depth for your input.</p> <p>Use a small separation value for fast camera moves and a larger value for slow camera moves.</p> <p>Increasing the separation gives a larger baseline and more accurate depth. However, a high separation reduces the quality of image matching and gives incorrect 3D points.</p> <p>Animate the <b>FrameSeparation</b> to compensate for variable camera speeds.</p> <p>The camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p> <div>  <b>Note:</b> The <b>Analyse Sequence</b> and <b>Analyse Frame</b> buttons attempt to calculate the best separation. </div> |
| Calculated Accuracy | accuracy         | N/A           | <p>Displays the depth accuracy calculated when analyzing frame separation. Values closer to 1 are considered accurate, and values closer to 0 inaccurate.</p> <p>Use frames with a high accuracy when placing elements in 3D (for example, by clicking <b>Create Card</b> or using a PositionToPoints node).</p> <p>If you're not getting accurate depth values, try adjusting <b>Frame Separation</b> or using an <b>Ignore Mask</b>.</p>                                                                                                                                                                                                                                                                                                                                                                           |
| Depth Generation    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Depth Detail        | vectorDetail     | 0.5           | <p>Adjust this to vary the resolution of the images used to calculate the depth map. The default value of 0.5 equals half the image resolution. Lower values speed</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | up processing and deliver a smoother result. Higher values pick up finer details, but also increase processing time.                                                                                                                                                                                                                                                          |
| Normal Detail   | normalDetail     | 0.25          | <p>Adjusts the resolution of the surface normals. Reduce the detail to smooth out the normals pass.</p> <p>The default value of 0.25 causes the normals pass to be calculated at a quarter resolution.</p>                                                                                                                                                                    |
| Noise           | noiseLevel       | 0.01          | <p>Sets the amount of noise to ignore in the input footage when calculating the depth map.</p> <p>Try increasing this to smooth depth in flat image regions.</p>                                                                                                                                                                                                              |
| Strength        | strength         | 1             | <p>Sets the strength in matching pixels between frames. Increase this to force the matches, for example where fine details are missed, or reduce to smooth depth.</p> <p>In most cases, you can leave this at the default value.</p>                                                                                                                                          |
| Sharpness       | sharpness        | 0.5           | <p>Defines how distinct object boundaries should be. Increase sharpness to separate objects and reduce it to smooth depth.</p>                                                                                                                                                                                                                                                |
| Smoothness      | smoothness       | 0.5           | <p>Adjusts the smoothness weighting of the disparity calculation. Rather than affecting the depth calculation, this applies an intelligent blur on the result.</p> <p>A high smoothness can miss lots of local detail, but is less likely to produce noisy depth values. A low smoothness will concentrate on detail matching, even if the resulting depth map is jagged.</p> |
| Depth Limits    |                  |               |                                                                                                                                                                                                                                                                                                                                                                               |
| Near Clip Plane | near             | 0.1           | <p>Sets the minimum z depth. All depth values that are lower than this number are set to this value.</p>                                                                                                                                                                                                                                                                      |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                             |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------|
| Far Clip Plane   | far              | 10000         | Sets the maximum z depth. All depth values that are higher than this number are set to this value.                   |
| Mark Bad Regions | markRegions      | disabled      | When enabled, the regions where the depth calculation is ambiguous are marked in the depth map as very large values. |

# DepthToPosition

DepthToPosition takes depth data contained in an image file and the camera data to create a 2D position (xyz) pass. This pass is created by projecting the depth through the camera and recording the xyz positions of each projected point. The DepthToPosition node can be used together with the PositionToPoints node to create a point cloud, similar to the effect achieved with the DepthToPoints node.



**Tip:** DepthToPosition's classic 3D system equivalent is the [DepthToPosition](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                   |
|-----------------|-----------------|--------------------------------------------------------------------------------------------|
| Input           | camera          | The 3D tracked camera that corresponds to the image input.                                 |
|                 | image           | The image from which the position pass is generated, and where all the depth data resides. |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DepthToPosition Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                   |
| Output              | output           | rgb           | Specifies the channels the output position pass is put into, and includes the option to create a new layer for this purpose.                                                                                                                                                                                                                                      |
| Depth               | depth            | depth.Z       | <p>Sets the channel from the <b>image</b> input from which you want to take the depth data.</p> <div>  <b>Note:</b> The depth information must be in the 1/Z format, where depth is 1 divided by input depth. Nuke and RenderMan use this depth calculation by default. </div> |
| Invert Depth        | invert           | off           | Invert the depth before processing the depth pass image. If the data in the depth channel is in the Z format, rather than the required 1/Z format, you can enable <b>invert depth</b> to convert the depth data.                                                                                                                                                  |
| Far                 | far              | 10000         | Specifies a value beyond which depth values from the camera are ignored when calculating the position pass.                                                                                                                                                                                                                                                       |

## DirectLight

DirectLights emit parallel light in one direction and appear to illuminate all objects with equal intensity, as if it was coming from a far away source. For example, you can use direct light to simulate sunlight and moonlight. Being at an infinite distance from the objects, direct light has orientation, but no position. To generate accurate shadows from a direct light, view the scene through the light (using the Viewer's camera dropdown menu, just like a camera) and adjust the DirectLight's **Scale** controls so that the part of the scene that should cast shadows fits within the view. This ensures that none of the shadow-casting geometry is missed by the depth map.

See also [EnvironmentLight](#), [PointLight](#), and [SpotLight](#).

 **Tip:** DirectLight's classic 3D system equivalent is the [Direct](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | look            | An optional input to force the light to "look" at an Axis node.                                                                                                                                                                                                                                                                                                                                                                               |
|                 | axis            | An optional input to link the position, rotation, scale, and skew of the transformed 3D object(s) to an Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node. <div> <b>Tip:</b> If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</div> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DirectLight Tab |                  |               |                                                                                                                                                                                                                               |
| Angle           | angle            | 0             | Controls the apparent radius of the direct light as seen from the camera. For example, the sun has a radius of about 0.5 degrees as seen from the Earth.<br><br>In practice, higher <b>Angle</b> values broaden the light and |

| Control (UI)             | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|--------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                          |               | soften shadow edges, whereas lower values produce sharper edges.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Color                    | color                    | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Intensity                | intensity                | 50000         | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Enable Color Temperature | enable_color_temperature | off           | Unsupported in the current USD library version used in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Color Temperature        | color_temperature        | 1             | Unsupported in the current USD library version used in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Exposure                 | exposure                 | 0             | Sets the brightness of the light as an indirect or ambient source of light, such as light reflected from the environment where the light is located.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Normalize                | normalize                | off           | Unsupported in the current USD library version used in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Diffuse                  | diffuse                  | 1             | Sets the amount of diffuse reflection created by the light, such as light bouncing off soft furnishings and clothing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Specular                 | specular                 | 1             | Sets the amount of specular reflection created by the light, such as light bouncing off metal and other highly reflective surfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Display                  | display                  | wireframe     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Selectable                                                                          | selectable       | on            | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                      |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>snapped to a new position depending on the points selected.</p> <ul style="list-style-type: none"> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                 |
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                    |
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                             |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                              |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                               |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)                                                                                                                                                                                     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                  |                  |               | location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate                                                                                                                                                                                     | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                  |
| Local Matrix                                                                                                                                                                                     |                  |               |                                                                                                                                                                                                                                                                                                                 |
| Specify Matrix                                                                                                                                                                                   | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                     |
| Matrix                                                                                                                                                                                           | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                           |
| World Matrix                                                                                                                                                                                     |                  |               |                                                                                                                                                                                                                                                                                                                 |
| World matrix                                                                                                                                                                                     | world_matrix     | N/A           | Displays the world or absolute xyz transform of the node in world coordinates.                                                                                                                                                                                                                                  |
| <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div> |                  |               |                                                                                                                                                                                                                                                                                                                 |
| Shadows Tab                                                                                                                                                                                      |                  |               |                                                                                                                                                                                                                                                                                                                 |
| cast shadows                                                                                                                                                                                     | cast_shadows     | off           | When enabled, the light casts shadows as defined by the <b>Shadow</b> controls.                                                                                                                                                                                                                                 |
| shadow mode                                                                                                                                                                                      | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be</li> </ul>                                                                                |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>completely solid. This option can be used with both ScanlineRender and PrmanRender.</p> <ul style="list-style-type: none"> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| scene epsilon | scene_epsilon    | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                                                                                                                                                                                                                    |
| samples       | samples          | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                            |
| sample width  | sample_width     | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is only relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bias               | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                    |
| slope bias         | depthmap_slope_bias | 0.01          | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| clipping threshold | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered transparent if their alpha is below the value set here.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| jitter scale       | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value</p>                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <p>for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                          |
| depthmap resolution | depthmap_width   | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| output mask         | shadow_mask      | off           | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                       |
|                     |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled.                                                                                                                                                                                                                                                                                                                  |

# EnvironmentLight

EnvironmentLights illuminate objects using an image of light from a real-world environment. This image-based lighting is generated using High Dynamic Range (HDR) images.

To use an environment light, you first need to shoot a real life environment as an HDR image. Using the SphericalTransform node, you then convert this image into a spherical mapped image. The sphere is used to surround the 3D objects, so that the mapped image color illuminates them.

Environment light only works with shiny object materials that can reflect the mapped image. It results in a very realistic lighting that makes it easier to integrate the objects into the environment.

See also [DirectLight](#), [PointLight](#), and [SpotLight](#).



**Tip:** EnvironmentLight's classic 3D system equivalent is the [Environment](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | look            | An optional input to force the light to "look" at an Axis node.                                                                                                                                                           |
|                 | axis            | An optional input to link the position, rotation, scale, and skew of the transformed 3D object(s) to an Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node. |



**Tip:** If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.

| Control (UI)             | Knob (Scripting)         | Default Value | Function                                                      |
|--------------------------|--------------------------|---------------|---------------------------------------------------------------|
| EnvironmentLight Tab     |                          |               |                                                               |
| Radius                   | guide_radius             | 100000        | Unsupported in the current USD library version used in Nuke.  |
| Color                    | color                    | 1             | Sets the color of the light.                                  |
| Intensity                | intensity                | 1             | Sets the brightness of the light as a direct source of light. |
| Enable Color Temperature | enable_color_temperature | off           | Unsupported in the current USD library version used in Nuke.  |
| Color Temperature        | color_temperature        | 1             | Unsupported in the current USD library version used in Nuke.  |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exposure                                                                            | exposure         | 0             | Sets the brightness of the light as an indirect or ambient source of light reflected from the environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Normalize                                                                           | normalize        | off           | Unsupported in the current USD library version used in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Diffuse                                                                             | diffuse          | 1             | Sets the amount of diffuse reflection created by the light, such as light bouncing off soft furnishings and clothing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Specular                                                                            | specular         | 1             | Sets the amount of specular reflection created by the light, such as light bouncing off metal and other highly reflective surfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Display                                                                             | display          | wireframe     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| Selectable                                                                          | selectable       | on            | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                            |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                   |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                    |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                     |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                     |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| specify matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                           |
| matrix          | matrix           | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                        |
| World Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)                                                                                                                                                                                   | Knob (Scripting) | Default Value | Function                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------|
| matrix                                                                                                                                                                                         | matrix           | N/A           | Displays the world or absolute xyz transform of the node in world coordinates. |
| <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div> |                  |               |                                                                                |

# FillShader

The FillShader node replaces selected material channels with a constant color.



**Tip:** FillShader's classic 3D system equivalent is the [FillMat](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | unnamed         | The 2D image you're using for the surface texture. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                    |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------|
| FillShader Tab |                  |               |                                                                                                                             |
| Channels       | channels         | rgba          | The effect is only applied to these channels.<br><br>You can use the checkboxes on the right to select individual channels. |
| Color          | color            | 0             | Adjusts the color used as the constant to replace the material.                                                             |

# GeoBindMaterial

The GeoBindMaterial node binds a material in the scene to all the objects specified in the **Mask** control. For example, connecting a Checkerboard node to the GeoBindMaterial **mat** input assigns the checkerboard material to a prim in the scene, such as /GeoCube1. If nothing is connected to the **mat** input, you can assign a material or shader from the Scene Graph using the **Material** control.



**Tip:** GeoBindMaterial's classic 3D system equivalent is the [ApplyMaterial](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                    |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect.                                                                                                                                                                                         |
|                 | mat             | An optional input supplying the material or shader you want to apply to the specified prims. If nothing is connected to the mat input, specify the material or shader to apply using a Scene Graph location in the <b>Material</b> control. |

| Control (UI)    | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoBindMaterial |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Mask            | mask_patterns    | {lastmodified} | Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b> , affects whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b> , to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> affects only those prims. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.                                                                                                             |
| Material     | material_path    | none          | Assigns a material or shader from the Scene Graph if nothing is connected to the <b>mat</b> input.<br><br> <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to bind materials. |

# GeoCard

The GeoCard node creates a card object in the scene with a prim path variable **{parent}/{nodename}** which is equal to the node name, such as /GeoCard1 or /GeoCard5. You can change the prim path to update the scene graph as required and set the objects **Kind**, **Purpose**, and **Visibility**.

Nuke only uses **Kinds** with the [GeoDrawMode](#) node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of **Kind** to create properly-constructed USD stages if you intend to export the scene for use in your pipeline.

The **Purpose** dropdown controls the type of geometry this object represents. The Viewer node's **Properties** > **3D** tab controls which purposes are visible in the 3D Viewer: **Render**, **Proxy**, or **Guide**. The **default** option essentially means 'always render this object', it has no special properties as far as renderers are concerned.

**Visibility** affects whether the object is visible or invisible when you export the scene. The default value is **inherited**, meaning the object's visibility is controlled by its parent object. You can set the cube's appearance using the color and opacity controls and the rows/columns settings determine how many vertices the object is split into. **Subdivision** determines how smoothing affects the object. The level of subdivision can be adjusted using the Viewer node's **Properties** on the **3D** tab under **Refine Level**. The **Refine Level** only affects the Viewer output, not the final rendered scene.

The **Transform** tab allows you to translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node. The **Lens Distortion** tab enables you to warp the card for use in lens distortion workflows including barrel and pincushion distortion depending on the slider values. You can also warp the card manually using the controls on the **Deform** tab. The **bilinear** deformation **type** allows you to make simple adjustments to the card's shape in 3D space, whereas **bicubic** gives you more flexibility with the addition of handles on each control point to adjust the curve of edges.

See also [GeoCube](#) and [GeoRevolve](#).



**Tip:** GeoCard's classic 3D system equivalent is the [Card](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                           |
|-----------------|-----------------|--------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene to which you want to add geometry. |
|                 | mat             | The file containing the material you want to apply to the object.  |

| Control (UI)                                                                                                                                                                                                                            | Knob (Scripting) | Default Value | Function                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoCard Tab                                                                                                                                                                                                                             |                  |               |                                                                                                                                                                      |
| Path                                                                                                                                                                                                                                    | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoCard1 or GeoCard5. |
| Parent Type                                                                                                                                                                                                                             | parent_type      | Xform         | Sets the type of prim to create if there are missing ancestors in the path.                                                                                          |
| <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist.         </div> |                  |               |                                                                                                                                                                      |
| Kind                                                                                                                                                                                                                                    | kind             | component     | Sets the <b>Kind</b> associated with this object. Nuke only                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>uses <b>Kinds</b> with the <a href="#">GeoDrawMode</a> node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of <b>Kind</b> to create properly-constructed USD stages if you intend to export the scene for use in your pipeline. The <b>model</b> option is valid, but should not be used in most cases:</p> <ul style="list-style-type: none"> <li>• <b>model</b> - the root prim in the scene, which is a superclass of group and component.</li> <li>• <b>assembly</b> - used to denote an important group in the scene.</li> <li>• <b>group</b> - a container for other kinds.</li> <li>• <b>component</b> - a leaf kind, which cannot contain other kinds apart from subcomponents.</li> <li>• <b>subcomponent</b> - a special leaf kind for use in components.</li> </ul> |
| Purpose      | purpose          | default       | <p>Sets the object's purpose, which can be used to control how a scene is rendered:</p> <ul style="list-style-type: none"> <li>• <b>default</b> - the object has no particular purpose and is rendered by default.</li> <li>• <b>render</b> - the object is the full resolution version for use when rendering the scene.</li> <li>• <b>proxy</b> - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times.</li> <li>• <b>guide</b> - the object is not rendered, but is visible in the Viewer for reference.</li> </ul> <div>  <p><b>Note:</b> The <b>render</b>, <b>proxy</b>, and <b>guide</b> purposes are only displayed in the 3D Viewer when they are enabled in the Viewer <b>Properties</b> in the <b>3D</b> tab.</p> </div>                                                        |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                       |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Visibility      | visibility       | inherited     | Controls whether the object and its descendants are visible in the scene: <ul style="list-style-type: none"> <li>• <b>inherited</b> - the object's visibility is controlled by its parent.</li> <li>• <b>invisible</b> - the object and its descendants are invisible in the scene.</li> </ul> |
| Display Color   | display_color    | 1             | Sets the color applied to the faces of the object. You can use the sliders, color picker, or colorwheel to select the required color.                                                                                                                                                          |
| Display Opacity | display_opacity  | 1             | Sets the opacity applied to the faces of the object, where 1 is fully opaque and 0 is fully transparent.                                                                                                                                                                                       |
| Double Sided    | double_sided     | off           | When enabled, the selected color and opacity is applied to both sides of the object's faces.                                                                                                                                                                                                   |
| Orientation     | orientation      | XY            | Sets the orientation of the card on the XY, YZ, or ZX axes.                                                                                                                                                                                                                                    |
| Image Aspect    | image_aspect     | on            | When enabled, the input image's format controls the card's aspect ratio. If no input image is connected, the <b>Project Settings &gt; full size format</b> aspect ratio is used.<br><br>When disabled, the card's aspect ratio reverts to a square format.                                     |
| Rows/Columns    | rows             | 8             | Sets the number of rows on the object. The maximum value is 4096, but high values may cause instability.                                                                                                                                                                                       |
|                 | columns          | 8             | Sets the number of columns on the object. The maximum value is 4096, but high values may cause instability.                                                                                                                                                                                    |
| Z               | z                | 0             | The card is placed this far from the origin and scaled in line with the <b>lens-in focal</b> distance and <b>lens-in haperture</b> value.                                                                                                                                                      |
| Lens-in Focal   | lens_in_focal    | 1             | This is the focal length of the camera that took the                                                                                                                                                                                                                                           |



| Control (UI)                                                                        | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                      |               | picture on the card. The card is scaled to the correct size so that at distance <b>z</b> it fills this field of view.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Lens-in Haperture                                                                   | lens_in_haperture    | 1             | This is the horizontal aperture of the camera that took the picture on the card. The card is scaled to the correct size so that at distance <b>z</b> it fills this field of view.                                                                                                                                                                                                                                                                                                                                                                        |
| Subdivision                                                                         | subdivision_scheme   | none          | <p>Sets the subdivision method to apply to this object:</p> <ul style="list-style-type: none"> <li>• <b>catmullClark</b></li> <li>• <b>loop</b></li> <li>• <b>bilinear</b></li> <li>• <b>none</b></li> </ul> <div>  <p><b>Note:</b> The level of subdivision can be adjusted using the Viewer node's <b>Properties</b> on the <b>3D</b> tab under <b>Refine Level</b>. The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene.</p> </div> |
| Boundary                                                                            | interpolate_boundary | none          | <p>Controls where interpolation is applied at boundaries between faces:</p> <ul style="list-style-type: none"> <li>• <b>none</b></li> <li>• <b>edge only</b></li> <li>• <b>edge and corner</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                |
| Transform Tab                                                                       |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|  | file_menu            | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> </ul>                                                                                                    |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                   |               | You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                           |
| Scale               | scaling           | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                    |
| Uniform Scale       | uniform_scale     | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                     |
| Skew                | skew              | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                     |
| Pivot Translate     | pivot_translate   | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate        | pivot_rotate      | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix        |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Specify Matrix      | use_matrix        | off           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                           |
| Matrix              | matrix            | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                        |
| Lens Distortion Tab |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Lock to Vertical    | use_vertical_lock | off           | When enabled, the distortion is limited to the width, vertical distortion is locked.                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|----------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A ( $r^3$ )    | lens_in_distort_a  | 0             | <p>Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.</p>  |
| B ( $r^2$ )    | lens_in_distort_b  | 0             | <p>Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.</p> |
| C ( $r^1$ )    | lens_in_distort_c  | 0             | <p>Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.</p> |
| Old Distortion |                    |               |                                                                                                                                                                                                                                                                                                                            |
| Distortion     | lens_in_distortion | 0             | Applies a lens distortion effect using an older Nuke algorithm. Smaller values make the edges of the card rounder, large values make the corners sharper.                                                                                                                                                                  |
| Power          | lens_in_power      | 4             | Controls the strength of the <b>distortion</b> parameter on the card.                                                                                                                                                                                                                                                      |
| Deform Tab     |                    |               |                                                                                                                                                                                                                                                                                                                            |
| Type           | type               | none          | <p>Select the deform type from the dropdown menu:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - the card is not deformed.</li> </ul>                                                                                                                                                                          |

| Control (UI)                                                                  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                               |                  |               | <ul style="list-style-type: none"> <li>• <b>bilinear</b> - the card is deformed using handles and the <b>bilinear</b> controls.</li> <li>• <b>bicubic</b> - the card is deformed using handles, tangents, and the <b>bicubic</b> controls.</li> </ul>                                                                                                                                                  |
| Reset Handles                                                                 | reset_handles    | N/A           | Click to reset the handles and tangents to their default position. A warning displays to confirm the reset.                                                                                                                                                                                                                                                                                            |
| Reset Tangents                                                                | reset_tangents   | N/A           | <p>When <b>break tangents</b> is disabled, click to reset the tangents to a third of the distance between their handle points to smooth out the deform curves. A warning displays to confirm the reset.</p> <div>  <b>Note:</b> This control has no effect when <b>type</b> is set to <b>bilinear</b>.         </div> |
| Copy                                                                          | copy_shape       | N/A           | Click to copy the current handle and tangent positions into a temporary buffer.                                                                                                                                                                                                                                                                                                                        |
| Paste                                                                         | paste_shape      | N/A           | Click to paste the handle and tangent positions from the temporary buffer onto the card.                                                                                                                                                                                                                                                                                                               |
| Set Key                                                                       | set_key_shape    | N/A           | Click to set a key for this frame on the handles and tangents.                                                                                                                                                                                                                                                                                                                                         |
| Delete Key                                                                    | del_key_shape    | N/A           | Click to delete a key from this frame on the handles and tangents.                                                                                                                                                                                                                                                                                                                                     |
| Delete Anim                                                                   | del_anim_shape   | N/A           | Click to delete the entire animation of all handles and tangents.                                                                                                                                                                                                                                                                                                                                      |
| Bilinear Controls - only available when <b>Type</b> is set to <b>Bilinear</b> |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                        |
| X/Y Points                                                                    | x_points         | 3             | Sets the number of x/y control points in the grid. The grid is not modified until you click <b>new shape</b> .                                                                                                                                                                                                                                                                                         |
|                                                                               | y_points         | 3             |                                                                                                                                                                                                                                                                                                                                                                                                        |
| New Shape                                                                     | new_shape        | N/A           | Click to apply the current <b>x/y points</b> values to the grid. A warning displays to confirm the new shape.                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X Subdivide  | x_subdivide      | N/A            | Subdivides the control points on the x axis creating new points equal to <b>x points</b> -1.                                                                                                                                                                                                                                                                                                                               |
| Y Subdivide  | y_subdivide      | N/A            | Subdivides the control points on the y axis creating new points equal to <b>y points</b> -1.                                                                                                                                                                                                                                                                                                                               |
| UV Position  | uv_position      | 0.3525, 0.3525 | Sets the position of the uv subdivide handle.                                                                                                                                                                                                                                                                                                                                                                              |
| UV Subdivide | uv_subdivide     | N/A            | Click to subdivide the card at the <b>uv position</b> . If the uv subdivide handle is on the card edge then only the u or v is subdivided.                                                                                                                                                                                                                                                                                 |
| U Subdivide  | u_subdivide      | N/A            | Subdivide the card at the u position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| V Subdivide  | v_subdivide      | N/A            | Subdivide the card at the v position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| CP           | control_points   | N/A            | <p>This collection of controls is used to navigate around the control points on the card. The index starts at 0 and each control point is described by column/row locations and three <b>xyz</b> coordinates.</p> <ul style="list-style-type: none"> <li>• The left and right arrows change the column index of the control point.</li> <li>• The up and down arrows change the row index of the control point.</li> </ul> |

Bicubic Controls - only available when **Type** is set to **Bicubic**

|             |             |     |                                                                                                                |
|-------------|-------------|-----|----------------------------------------------------------------------------------------------------------------|
| X/Y Points  | x_points    | 3   | Sets the number of x/y control points in the grid. The grid is not modified until you click <b>new shape</b> . |
|             | y_points    | 3   |                                                                                                                |
| New Shape   | new_shape   | N/A | Click to apply the current <b>x/y points</b> values to the grid. A warning displays to confirm the new shape.  |
| X Subdivide | x_subdivide | N/A | Subdivides the control points on the x axis creating new points equal to <b>x points</b> -1.                   |
| Y Subdivide | y_subdivide | N/A | Subdivides the control points on the y axis creating new points equal to <b>y points</b> -1.                   |

| Control (UI)      | Knob (Scripting)  | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UV Position       | uv_position       | 0.3525, 0.3525 | Sets the position of the uv subdivide handle.                                                                                                                                                                                                                                                                                                                                                                              |
| UV Subdivide      | uv_subdivide      | N/A            | Click to subdivide the card at the <b>uv position</b> . If the uv subdivide handle is on the card edge then only the u or v is subdivided.                                                                                                                                                                                                                                                                                 |
| U Subdivide       | u_subdivide       | N/A            | Subdivide the card at the u position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| V Subdivide       | v_subdivide       | N/A            | Subdivide the card at the v position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| Uniform Subdivide | uniform_subdivide | on             | When enabled, the tangents are shortened to create a more uniform subdivide.                                                                                                                                                                                                                                                                                                                                               |
| Break Tangent     | break_tangent     | off            | This control is present for the purposes of backward compatibility and should not be used in new scripts.                                                                                                                                                                                                                                                                                                                  |
| Mirror Tangent    | mirror_tangent    | off            | This control is present for the purposes of backward compatibility and should not be used in new scripts.                                                                                                                                                                                                                                                                                                                  |
| CP                | control_points    | N/A            | <p>This collection of controls is used to navigate around the control points on the card. The index starts at 0 and each control point is described by column/row locations and three <b>xyz</b> coordinates.</p> <ul style="list-style-type: none"> <li>• The left and right arrows change the column index of the control point.</li> <li>• The up and down arrows change the row index of the control point.</li> </ul> |

# GeoCollection

The GeoCollection node creates a collection attribute on an object. Enter an object, a list of paths and a collection name, and a collection is created on the object containing the paths. This can then be used later on in a path expression as a shortcut to refer to the paths. For example, you might create collections for all the lights or cameras in the scene or any prims that have shadows cast on them.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)    | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoCollection   |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Mask            | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, adds whatever was changed by the previous node to the collection. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/PointLight1 /SpotLight1_3</b> adds only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Collection Name | collection_name  | none           | Sets the name of the collection to create and authors a collection token in the USD source.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Includes        | includes         | none           | Specifies prims to explicitly include from the collection. For example, <b>//PointLight*</b> adds all PointLights to the collection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Excludes        | excludes         | none           | Specifies prims to explicitly exclude from the collection. For example, <b>/PointLight1</b> explicitly excludes PointLight1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



## Collection Workflow Example

This simple example creates a cube, duplicates the cube using GeoInstance, and then passes GeoScope and GeoCollection information to a GeoPrune to remove instances of the cube starting with **/GeoCube1\_3\*** from the scene.

### Pruning Cube Duplicates by Collection

```

1  set cut_paste_input [stack 0]
2  push $cut_paste_input
3  GeoCube {
4    setAuthorMode {display_color set}
5    display_color {1 0.749311 0.020768}
6    display_color_panelDropped true
7    name GeoCube1
8    xpos 195
9    ypos -249
10 }
11 GeoInstance {
12   count 4
13   translate {1.889999986 0 0}
14   name GeoInstance1
15   xpos 195
16   ypos -225
17 }
18 GeoInstance {
19   translate {0 0 1.889999986}
20   name GeoInstance2
21   xpos 195
22   ypos -201
23 }
24 GeoScope {
25   prim_path /collections
26   name GeoScope2
27   xpos 195
28   ypos -177
29 }
30 GeoCollection {
31   mask_patterns /collections
32   collection_name cubes
33   includes /GeoCube1_3*
34   name GeoCollection2
35   xpos 195
36   ypos -153
37 }
38 GeoPrune {
39   mask_patterns "%/collections:cubes"
40   name GeoPrune2
41   xpos 195
42   ypos -129
43 }
44 Viewer {
45   frame_range 1-100
46   gl_lighting true
47   monitorOutOutputTransform rec709

```

```

48 |   name Viewer1
49 |   xpos 195
50 |   ypos -105
51 | }

```

# GeoCube

The GeoCube node creates a cube object in the scene with a prim path variable **{parent}/{nodename}** which is equal to the node name, such as /GeoCube1 or /GeoCube5. You can change the prim path to update the scene graph as required and set the object's **Kind**, **Purpose**, and **Visibility**.

Nuke only uses **Kinds** with the [GeoDrawMode](#) node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of **Kind** to create properly-constructed USD stages if you intend to export the scene for use in your pipeline.

The **Purpose** dropdown controls the type of geometry this object represents. The Viewer node's **Properties** > **3D** tab controls which purposes are visible in the 3D Viewer, **Render**, **Proxy**, or **Guide**. The **default** option essentially means 'always render this object', it has no special properties as far as renderers are concerned.

**Visibility** affects whether the object is visible or invisible when you export the scene. The default value is **inherited**, meaning the object's visibility is controlled by its parent object. You can set the cube's appearance using the color and opacity controls and the rows/columns settings determine how many vertices the object is split into.

Setting the **Mesh Type** to **shared vertices** and choosing a **Subdivision** option allows you to smooth the object. The level of subdivision can be adjusted using the Viewer node's **Properties** on the **3D** tab under **Refine Level**. The **Refine Level** only affects the Viewer output, not the final rendered scene.

The **Transform** tab allows you to translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node.

See also [GeoCard](#) and [GeoRevolve](#).



**Tip:** GeoCube's classic 3D system equivalent is the [Cube](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                           |
|-----------------|-----------------|--------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene to which you want to add geometry. |
|                 | mat             | The file containing the material you want to apply to the object.  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoCube Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Path         | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoCube1 or GeoCube5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Parent Type  | parent_type      | Xform         | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Kind         | kind             | group         | <p>Sets the <b>Kind</b> associated with this object. Nuke only uses <b>Kinds</b> with the <a href="#">GeoDrawMode</a> node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of <b>Kind</b> to create properly-constructed USD stages if you intend to export the scene for use in your pipeline. The <b>model</b> option is valid, but should not be used in most cases:</p> <ul style="list-style-type: none"> <li>• <b>model</b> - the root prim in the scene, which is a superclass of group and component.</li> <li>• <b>assembly</b> - used to denote an important group in the scene.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>group</b> - a container for other kinds.</li> <li>• <b>component</b> - a leaf kind, which cannot contain other kinds apart from subcomponents.</li> <li>• <b>subcomponent</b> - a special leaf kind for use in components.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Purpose       | purpose          | default       | <p>Sets the object's purpose, which can be used to control how a scene is rendered:</p> <ul style="list-style-type: none"> <li>• <b>default</b> - the object has no particular purpose and is rendered by default.</li> <li>• <b>render</b> - the object is the full resolution version for use when rendering the scene.</li> <li>• <b>proxy</b> - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times.</li> <li>• <b>guide</b> - the object is not rendered, but is visible in the Viewer for reference.</li> </ul> <div>  <b>Note:</b> The <b>render</b>, <b>proxy</b>, and <b>guide</b> purposes are only displayed in the 3D Viewer when they are enabled in the Viewer <b>Properties</b> in the <b>3D</b> tab. </div> |
| Visibility    | visibility       | inherited     | <p>Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance.</p> <ul style="list-style-type: none"> <li>• <b>inherited</b> - the object's visibility is controlled by its parent.</li> <li>• <b>invisible</b> - the object and its descendants are invisible in the scene.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Display Color | display_color    | 1             | <p>Sets the color applied to the faces of the object. You can use the sliders, color picker, or colorwheel to select the required color.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)    | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display Opacity | display_opacity  | 1                 | Sets the opacity applied to the faces of the object, where 1 is fully opaque and 0 is fully transparent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Double Sided    | double_sided     | off               | When enabled, the selected color and opacity is applied to both sides of the object's faces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rows/Columns    | rows             | 10                | Sets the number of rows on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                 | columns          | 10                | Sets the number of columns on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Cube            | cube             | -0.5, 0.5         | <p>Specifies the dimensions of the cube (from a positive z axis viewpoint):</p> <ul style="list-style-type: none"> <li>• <b>x</b> - controls the left face on the x axis.</li> <li>• <b>y</b> - controls the bottom face on the y axis.</li> <li>• <b>n</b> - controls the back face on the z axis.</li> <li>• <b>r</b> - controls the right face on the x axis.</li> <li>• <b>t</b> - controls the top face on the y axis.</li> <li>• <b>f</b> - controls the front face on the z axis.</li> </ul>                                                                                                                                                                                                                                                                               |
| Mesh Type       | mesh_type        | separate vertices | <p>Determines how vertices and faces are affected by the <b>Subdivision</b> control:</p> <ul style="list-style-type: none"> <li>• <b>separate vertices</b> - edge vertices are separated so that they are not affected by <b>Subdivision</b>.</li> <li>• <b>shared vertices</b> - vertices are shared between the faces and end caps so that when <b>Subdivision</b> is enabled, the chosen smoothing method is applied.</li> </ul> <div>  <p><b>Note:</b> The level of subdivision can be adjusted using the Viewer node's <b>Properties</b> on the <b>3D</b> tab under <b>Refine Level</b>. The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene.</p> </div> |

| Control (UI) | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                      |               | <ul style="list-style-type: none"> <li>• <b>separate faces</b> - separate face meshes are added to the scene graph for the body and end caps. Enabling <b>Subdivision</b> has no effect.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Normals      | normals              | none          | <p>Sets the type of normals generated:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no normals are generated on the base prim, but may be generated by subdivision.</li> <li>• <b>face-vertex</b> - normals are generated for face vertices.</li> </ul> <div>  <p><b>Tip:</b> Normals are not displayed in the Viewer by default. If you want to display normals in the Viewer, press <b>S</b> over the Viewer, go to the <b>3D</b> tab in the Viewer <b>Properties</b> panel, and enable the <b>show</b> &gt; normals options by clicking the required buttons.<br/>See the <a href="#">Viewer</a> node for more information.</p> </div> |
| Subdivision  | subdivision_scheme   | none          | <p>Sets the subdivision method to apply when <b>Mesh Type</b> is set to <b>shared vertices</b>:</p> <ul style="list-style-type: none"> <li>• <b>catmullClark</b></li> <li>• <b>loop</b></li> <li>• <b>bilinear</b></li> <li>• <b>none</b></li> </ul> <div>  <p><b>Note:</b> The level of subdivision can be adjusted using the Viewer node's <b>Properties</b> on the <b>3D</b> tab under <b>Refine Level</b>. The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene.</p> </div>                                                                                                                                       |
| Boundary     | interpolate_boundary | none          | <p>Controls where interpolation is applied at boundaries between faces:</p> <ul style="list-style-type: none"> <li>• <b>none</b></li> <li>• <b>edge only</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)                                                                       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                    |                  |               | <ul style="list-style-type: none"> <li>• <b>edge and corner</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Transform Tab                                                                      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|   | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |

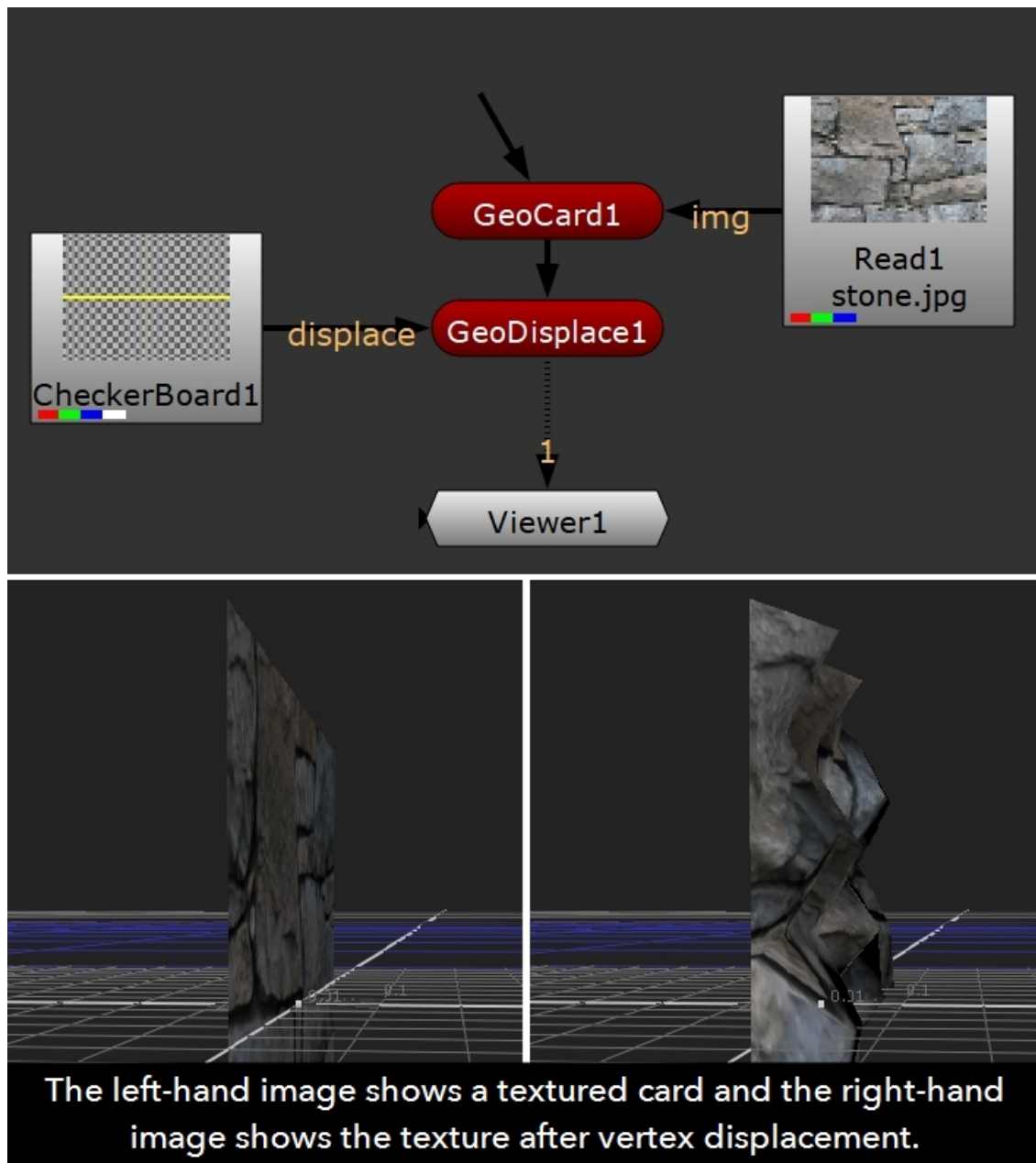
| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transform Order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                      |
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                    |
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                  |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                   |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                    |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                     |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                     |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Specify Matrix  | use_matrix       | off           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                           |
| Matrix          | matrix           | N/A           | The matrix displays values from the object's transform,                                                                                                                                                                                                                                                                                                                                                               |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | rotate, scale, skew, and pivot controls.<br><br>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene. |

# GeoDisplace

The GeoDisplace node moves each vertex along the normal to the surface according to channels in a texture map connected to the **displace** input. You can use displacement to quickly add detail to geometry without modeling it manually. This simple example shows using a CheckerBoard to displace the vertices on a card to create a bumpy surface.



**Tip:** GeoDisplace's classic 3D system equivalent is the [DisplaceGeo](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                             |
|-----------------|-----------------|------------------------------------------------------|
| Input           | displace        | The image you want to use to modify the 3D geometry. |
|                 | unnamed         | The previous stage in the scene you want to affect.  |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoDisplace  |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Mask         | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the effect to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the effect to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Channels     | channels         | rgb            | <p>The <b>displace</b> input's channels to use for the displacement value.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Source       | source           | luminance      | <p>The source channel you want GeoDisplace to get a displacement map from. For example, if you selected <b>rgb</b> or <b>rgba</b> from the <b>channels</b> dropdown menu, you can use the red, green, or blue channel, or the pixel luminance as the source.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>luminance, red, green, blue, alpha</b> - offset each vertex along its normal by the selected channel value supplied by the <b>displace</b> input.</li> <li>• <b>rgb absolute</b> - set each vertex's position to the XYZ position in the selected channel supplied by the <b>displace</b> input.</li> <li>• <b>rgb relative</b> - offset each vertex's current position by the XYZ position in the selected channel supplied by the <b>displace</b> input.</li> </ul>                                                                                                                                                         |
| Scale        | scale            | 0.1           | Increase or decrease the scale of the displacement. The higher the value, the bigger the displacement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Weight xyz   | weight           | 1, 1, 1       | To give x, y, and z scale different weightings, enter new weights the <b>weight</b> fields. By default, each weighting is set to 1. If you don't want to make changes to a value, set its weight to 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Offset xyz   | offset           | 0, 0, 0       | To offset x, y, and z values from the center of the geometry object, enter the value by which you want to offset them in the <b>offset</b> fields. For example, if you enter 0.5 in the <b>offset y</b> field, 0.5 is added to the y value.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Filter Size  | filter_size      | 5             | Change the size of the filter used to sample the <b>displace</b> input texture.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Filter       | filter           | Parzan        | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> </ul> |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <ul style="list-style-type: none"> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| UV Attribute Name   | uv_attrib_name   | uv            | <p>Change the name of the attribute that's used as the vertex's UV coordinates to find the image pixel. Normals are stored as a named attribute for a piece of geometry.</p> <ul style="list-style-type: none"> <li>• <b>Cf</b> - surface color</li> <li>• <b>N</b> - normal</li> <li>• <b>PW</b> - world-space point</li> <li>• <b>uv</b> - texture coordinates</li> <li>• <b>vel</b> - point velocity.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Recalculate Normals | recalc_normals   | on            | <p>When enabled, recalculate the normals after the displacement. Normals are usually incorrect after vertices have been moved.</p> <p>When disabled, use the normal values after displacement without recalculating.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

# GeoDrawMode

The GeoDrawMode node sets the draw mode for objects with a **Kind** assigned, allowing you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of **Kind** to create properly-constructed USD stages if you intend to export the scene for use in your pipeline.



**Note:** Draw mode only works on objects that have their **Kind** set. Objects with no **Kind** assigned are unaffected.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoDrawMode  |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Mask         | mask_patterns    | {lastmodified} | Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b> , applies the draw mode to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b> , to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the transform to only those prims. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               |  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Apply Draw Mode | apply_draw_mode  | on            | <p>When enabled, any prims with a <b>Kind</b> set are drawn using the selected <b>Draw Mode</b>. Any prims with no <b>Kind</b> set are drawn as normal.</p> <p>The selected prims are also assigned the <b>model:applyDrawMode</b> attribute when this control is enabled, which can be inherited by prims in subtrees.</p> <p>When disabled, all prims are drawn as normal.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Draw Color      | draw_mode_color  | 1, 0, 0       | Sets the draw color of the replacement proxy prims.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Draw Mode       | draw_mode        | Default       | <p>When <b>Apply Draw Mode</b> is enabled, the specified prims are affected by the mode selected:</p> <ul style="list-style-type: none"> <li>• <b>Origin</b> - the prims are replaced by a proxy origin indicator drawn in the selected <b>Draw Color</b>.</li> <li>• <b>Bounds</b> - the prims are replaced by a proxy bounding box indicator drawn in the selected <b>Draw Color</b>.</li> <li>• <b>Cards</b> - the prims are replaced by proxy cards drawn in the selected <b>Draw Color</b>. The appearance of the cards is determined by the <b>Card Geometry</b> and <b>Texture XYZ</b> controls.</li> <li>• <b>Default</b> - the prims are drawn as normal, regardless of what <b>Kind</b> attribute they have set.</li> <li>• <b>Inherited</b> - the prims inherit their <b>Draw Mode</b> from their parent prim.</li> </ul> |
| Card Geometry   | card_geometry    | Cross         | <p>When <b>Draw Mode</b> is set to <b>Card</b>, determines how the proxy cards are drawn:</p> <ul style="list-style-type: none"> <li>• <b>Cross</b> - two proxy cards replace the specified prims along the XYZ axes.</li> <li>• <b>Box</b> - six proxy cards replace the specified prims a box</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI) | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                  |
|--------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                    |               | shape.                                                                                                                                                                                                                                                                                                                                    |
| Texture XYZ  | card_texture_X_neg | none          | Specifies files on disk as textures applied to the proxy cards and sets the texture's orientation on the card's XYZ axes. <div>  <b>Note:</b> The <b>Texture</b> controls are only available when <b>Draw Mode</b> is set to <b>Card</b>.         </div> |
|              | card_texture_X_pos | none          |                                                                                                                                                                                                                                                                                                                                           |
|              | card_texture_Y_neg | none          |                                                                                                                                                                                                                                                                                                                                           |
|              | card_texture_Y_pos | none          |                                                                                                                                                                                                                                                                                                                                           |
|              | card_texture_Z_neg | none          |                                                                                                                                                                                                                                                                                                                                           |
|              | card_texture_Z_pos | none          |                                                                                                                                                                                                                                                                                                                                           |

# GeoDuplicate

The GeoDuplicate node creates a copy of a prim that exists in the scene with a new user-defined scenegraph location. The new location is required because each object in USD must have a unique path, it doesn't allow more than one object to have the same path. You can use GeoDuplicate to reproduce the classic Nuke 3D system workflow of copying objects and merging them back into the scene.

See also [GeoMerge](#), [Geololate](#), and [GeoPrune](#).



## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI) | Knob (Scripting) | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoDuplicate |                  |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Mask         | mask_patterns    | {lastmodified}     | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the effect to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the effect to only those prims.</p> <div>  <b>Tip:</b> You can also use the scene graph popup, cog menu, Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Prim Path    | prim_path        | {path}_ {nodename} | <p>The root path of the new object. <b>Prim Path</b> defaults to the variable <b>{path}_{nodename}</b>, which is equal to the path plus the node name, such as <b>GeoCard1_GeoDuplicate1</b> or <b>GeoCard5_GeoDuplicate2</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Parent Type  | parent_type      | Xform              | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist. </div>                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode         | mode             | Duplicate     | <p>Sets the duplication mode:</p> <ul style="list-style-type: none"> <li>• <b>Duplicate</b> - creates a standalone, flattened copy of the specified object. <b>Duplicate</b> can be computationally expensive because it includes flattened versions of all children of the specified object. Changes made to the source object do not affect the duplicate.</li> </ul> <div>  <p><b>Tip:</b> <b>Duplicate</b> mode flattens the incoming USD layers in order to create the duplicate because a prim could be defined across multiple USD files. In this case, Nuke can't define the duplicate object in the layers from which the original was derived. For example, the source layer might be a read-only layer loaded from disk.</p> </div> <ul style="list-style-type: none"> <li>• <b>Reference</b> - creates an instance of the specified object. <b>Reference</b> is computationally cheaper, as it is not flattened, and changes made to the source object are reflected in the referenced duplicate.</li> </ul> |

# GeoExport

The GeoExport node exports a flattened stage to a file. You can export USD files using the **.usd**, **.usdc**, and **.usda** file extensions.



**Note:** Writing the whole flattened stage is not a common workflow unless you are creating a stage from scratch with Nuke nodes.



**Tip:** GeoExport's classic 3D system equivalent is the [WriteGeo](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                        |
|-----------------|-----------------|-----------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to flatten and export. |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoExport                                                                                                                                              |                   |               |                                                                                                                                                      |
| File                                                                                                                                                   | file              | none          | Specifies the file path to where the stage is written including the required file format, <b>.usd</b> , <b>.usdc</b> , <b>.usda</b> or <b>.abc</b> . |
| Execute                                                                                                                                                | Execute           | N/A           | Click to write the stage to disk.                                                                                                                    |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                      |
| Before Render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                         |
| Before Each Frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| After Each Frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| After Render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| Render Progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# GeoImport

The GeoImport node is used to import USD and Alembic objects from external **.usd** and **.abc** files into Nuke. GeoImport does not allow you to change the **Path** of the object in the scene graph so importing the same file more than once has no effect because the objects would be overwritten with the same data. If you want to import the same object multiple times, use the GeoReference node to create an instance, or light-weight copy, of the required objects.

See also [GeoReference](#).



**Tip:** GeoImport's classic 3D system equivalent is the [ReadGeo](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                          |
|-----------------|-----------------|-------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene to which you want to add objects. |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                        |
|-------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoImport         |                   |               |                                                                                                                                                                                                                 |
| File              | file              | none          | The path to the external file that you want to import.                                                                                                                                                          |
| Reload            | reload            | N/A           | Click to update the scene graph with any changes made to the external USD file specified in the <b>File</b> control.                                                                                            |
| Display Materials | display_materials | off           | When enabled, any materials included in the specified file are visible in the Viewer.<br><br>When disabled, the materials are still loaded and can be bound to prims, but they are not displayed in the Viewer. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use Up Axis    | use_up_axis      | on            | <p>When enabled, a transform is added to the imported prim to match the up axis in the current layer.</p> <p>When disabled, the prim is imported without any transform applied.</p> <div>  <b>Note:</b> The root prims in the layer must be transformable for this control to have any effect. </div> |
| Time Remapping |                  |               |                                                                                                                                                                                                                                                                                                                                                                                        |
| Offset         | time_offset      | 0             | Offsets the USD prim animation by this amount                                                                                                                                                                                                                                                                                                                                          |
| Scale          | time_scale       | 1             | Scales the referenced prim animation by this amount. Values between 0 and 1 speed up the animation and values higher than 1 slow it down.                                                                                                                                                                                                                                              |

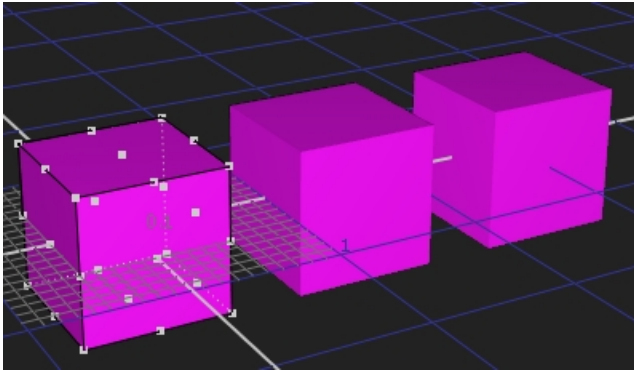
# GeoInstance

The GeoInstance node creates a number of instances of an object, allowing you to duplicate a prim multiple times. An instance is a reference to another object rather than a copy of it, so if the original is modified, the instances are also modified. GeoInstance has three **Instance Modes**:

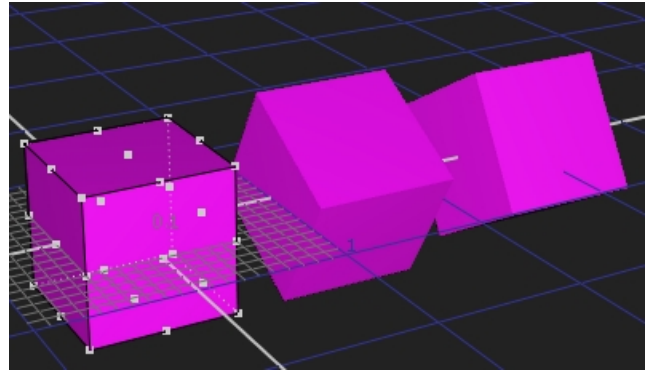
- **reference** - creates a number of reference instances from the source object. You can modify an individual instance using its unique path in the Scene Graph, giving you full control of each instance.
- **instanceable reference** - similar to the **reference** mode, but computationally cheaper. You can use **instanceable reference** mode for small groups of referenced prims, such as cars and crowd scenes.
- **point instancer** - creates a single Scene Graph location containing all instances, which is computationally cheaper than **instanceable reference** mode, but the instances cannot be modified individually by downstream nodes. This mode is mostly useful for particles or other geometry with thousands of parts as you can only modify the whole instance at once.

GeoInstance includes options to control what happens to the source object and the number of instances created. The name of instances created is **{name}\_{index}** by default, which adds a number after the source prim name, such as GeoRevolve1\_1 and GeoRevolve1\_2.

The transform controls affect all the instances in the scene and are applied to each instance from the previous instance's position. The second instance is transformed and then the third instance is transformed by the same amount, but from the position of the second instance, and so on. For example, with a **Count** of **3** instances and **Rotate x** value of **30** in the **Properties** panel, the first instance is not affected, the second instance is rotated **30**, and the third instance is rotated **60**.



Three instances of a cube geometry.



The same three instances with a **Rotate x** value of 30.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoInstance  |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Mask         | mask_patterns    | {lastmodified} | Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b> , instances whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b> , to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> instances only those prims. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               |  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Instance Mode | instance_mode    | reference     | <p>Specifies the type of instances to create:</p> <ul style="list-style-type: none"> <li>• <b>reference</b> - creates a number of reference instances from the source object. You can modify an individual instance using its unique path in the Scene Graph, giving you full control of each instance.</li> <li>• <b>instanceable reference</b> - similar to the <b>reference</b> mode, but computationally cheaper. You can use <b>instanceable reference</b> mode for small groups of referenced prims, such as cars and crowd scenes.</li> <li>• <b>point instancer</b> - creates a single Scene Graph location containing all instances, which is computationally cheaper than <b>instanceable reference</b> mode, but the instances cannot be modified individually. This mode is useful for particles or other geometry with thousands of parts as you can only modify the whole instance at once.</li> </ul> |
| Original      | original_mode    | deactivate    | <p>Determines what happens to the original objects specified in the <b>Mask</b> control:</p> <ul style="list-style-type: none"> <li>• <b>deactivate</b> - the source prims are deactivated, as if they were never in the scene.</li> <li>• <b>activate</b> - the source prims are activated, which can be useful to override inherited deactivation.</li> <li>• <b>hide</b> - the source prims are hidden in the scene, but can still be referenced as normal.</li> <li>• <b>show</b> - the source prims are shown in the scene, which can be useful to override an inherited hidden state.</li> <li>• <b>include</b> - the source prims are included in the instance <b>Count</b> replacing the first instance, so one fewer instances is created.</li> </ul>                                                                                                                                                       |
| Count         | count            | 2             | Specifies the number of instances to create from the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)                                                                        | Knob (Scripting)           | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|----------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                            |                | objects in the <b>Mask</b> control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Path                                                                                | instances_path             | none           | Specifies the Scene Graph path under which the instances are created. The referenced node name is used if Path is left blank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Parent Type                                                                         | instances_parent_prim_type | Xform          | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> The default, <b>None</b>, may cause some referenced objects to behave as if they don't exist. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Naming                                                                              | names                      | {name}_{index} | <p>Specifies the naming convention for the instances in the Scene Graph. The default, <b>{name}_{index}</b>, creates instances named from the <b>Mask</b> control and the index number of the instance. For example, if GeoCube1 is instanced with a <b>Count</b> of <b>3</b>:</p> <ul style="list-style-type: none"> <li>• GeoCube1_1</li> <li>• GeoCube1_2</li> <li>• GeoCube1_3</li> </ul> <p>You can also use the following tokens to create your own naming convention:</p> <ul style="list-style-type: none"> <li>• <b>{name}</b> - the name of the original object.</li> <li>• <b>{index}</b> - the 1-based index of the new object.</li> <li>• <b>{count}</b> - the total count.</li> <li>• <b>{srcindex}</b> - the index in the list of the source objects.</li> <li>• <b>{srccount}</b> - the count of source objects.</li> </ul> |
|  | file_menu                  | N/A            | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the instanced objects according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



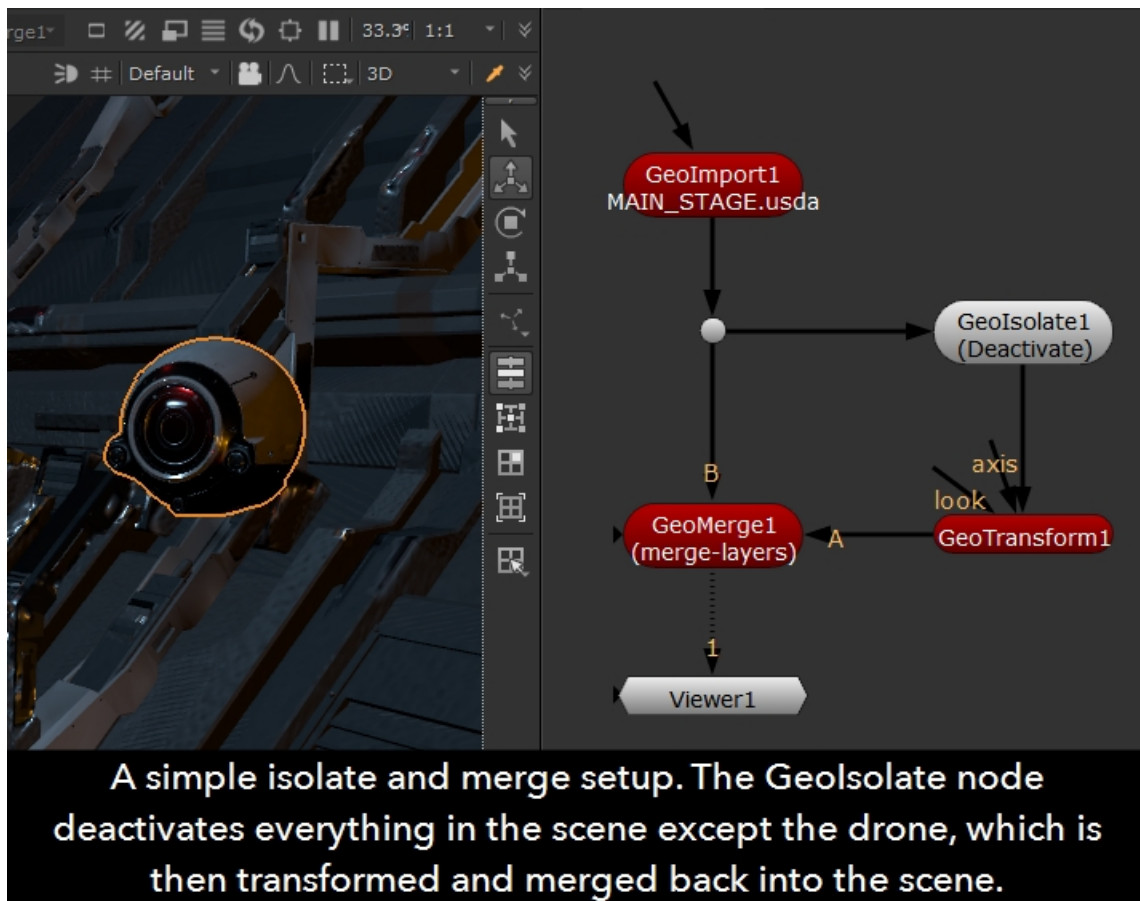
| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the instanced objects as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the instanced objects are snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the instanced objects are snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the instanced objects are snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Translate                                                                         | translate        | 0, 0, 0       | Lets you translate the instanced objects along the x, y, and z axes. You can also adjust translate values by clicking and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                 |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the instanced objects around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                        |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the instanced objects on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                         |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the instanced objects simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                          |
| Skew            | skew             | 0, 0, 0       | Lets you skew the instanced objects on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                          |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Specify Matrix  | use_matrix       | off           | Enable this control to specify matrix values for the instanced objects you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                |
| Matrix          | matrix           | N/A           | The matrix displays values from the instanced object's transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                              |

# Geololate

The Geololate node operates in a similar way to GeoPrune in that it also creates overrides for visibility and the active state, but the **Invert Selection** control is on by default.

You can then modify the isolated geometry and merge back to the main stage with the GeoMerge **Merge Mode** set to **Deisolate**. The isolated layer is merged in the same way as the **Merge Layers** mode, but any layers created by Geololate nodes are removed. The result is that your modifications persist when merged back to the main stage.



See also [GeoMerge](#), [GeoDuplicate](#), and [GeoPrune](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)     | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------|------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geololate        |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Mask             | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the effect to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the effect to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Invert Selection | invert_mask      | on             | <p>When <b>on</b>, the <b>Mask</b> path selection is inverted so that the specified objects are isolated from the incoming layer.</p> <p>When <b>off</b>, the specified objects are not isolated.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Method           | method           | hide           | <p>Sets how the isolated objects behave:</p> <ul style="list-style-type: none"> <li>• <b>hide</b> - the objects are not visible or active in the scene graph or renders of the scene. Hidden elements are still present in the USD file, but they are not considered during stage composition. You can use <b>hide</b> to temporarily remove objects from view without actually deleting them from the file.</li> <li>• <b>show</b> - the objects are shown if they were previously</li> </ul>                                                                                                                                                                                                                |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>hidden.</p> <ul style="list-style-type: none"> <li>• <b>deactivate</b> - the objects are temporarily disabled or turned off. Unlike hiding, a deactivated object is still considered during stage composition, but it is effectively inactive in the scene. This is commonly used to stop objects affecting a scene's behavior without removing them.</li> <li>• <b>activate</b> - the objects are reactivated if they were previously deactivated.</li> </ul> |

# GeoMerge

The GeoMerge node combines prims from different node branches and lets you manage how layers are merged. This node provides various options for merging layers giving control of subsequent exports.

You can then affect all objects attached to the GeoMerge at once. For example, you could add a GeoTransform downstream with the **Mask** set to **/\*** (forward-slash asterisk) to transform the entire scene in one operation. GeoMerge is functionally equivalent to GeoScene and does not have any node-specific properties.



**Note:** Prims downstream from GeoMerge with **Mask** set to **{lastmodified}** inherit from the strongest layer, the layer connected to the highest numbered input.

See also [GeoScene](#).



**Tip:** GeoMerge's classic 3D system equivalent is the [MergeGeo](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                     |
|-----------------|-----------------|--------------------------------------------------------------|
| Input           | numbered inputs | Combines any new 3D system prims you want to merge together. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoMerge     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Merge Mode   | mode             | Merge Layers  | <p>Sets how the merge is performed:</p> <ul style="list-style-type: none"> <li>• <b>Merge Layers</b> - the default behavior for merging, it combines the prims from one pipe with the prims of another pipe.</li> </ul> <p>It adds all layers from the inputs to the layer stack.</p> <p>See <a href="#">Merge Layers</a>.</p> <ul style="list-style-type: none"> <li>• <b>Duplicate Prims</b> - Allows you to take a prim input and create a copy with a user-defined name.</li> </ul> <p>This flattens all A inputs and duplicates their root prims. The B input is merged unchanged - only prims that exist on both branches are duplicated.</p> <p>See <a href="#">Duplicate Prims</a>.</p> <ul style="list-style-type: none"> <li>• <b>Flatten Layers</b> - Flattens layers from each input and adds the flattened single layer to the layer stack.</li> </ul> <p>See <a href="#">Flatten Layers</a>.</p> <ul style="list-style-type: none"> <li>• <b>Flatten to Single Layer</b> - Flattens the layers from each input into one single layer.</li> </ul> |

| Control (UI)                    | Knob (Scripting) | Default Value          | Function                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 |                  |                        | See <a href="#">Flatten to Single Layer</a> .                                                                                                                                                                                                                                                                                                                        |
| Deisolate                       | deisolate        | off                    | Turn on to remove all the layers from all Geoisolate nodes in any of the inputs.                                                                                                                                                                                                                                                                                     |
| Duplicate Prims option settings |                  |                        |                                                                                                                                                                                                                                                                                                                                                                      |
| Copy Name                       | path_pattern     | {path}_Copy<br>{index} | <p>The path of the duplicated prim(s). If this is left empty, a suffix of <b>CopyN</b> is added.</p> <p>You can use the following terms in the path to substitute text:</p> <p><b>\$(name)</b> - name of the prim</p> <p><b>\$(path)</b> - full path of the prim</p> <p><b>\$(count)</b> - total number of inputs</p> <p><b>\$(nodename)</b> - name of this node</p> |
| Duplicate in place              | in_place         | off                    | Choose whether to duplicate the whole hierarchy containing the prim or to attempt to only duplicate prims that were modified in the input branch.                                                                                                                                                                                                                    |

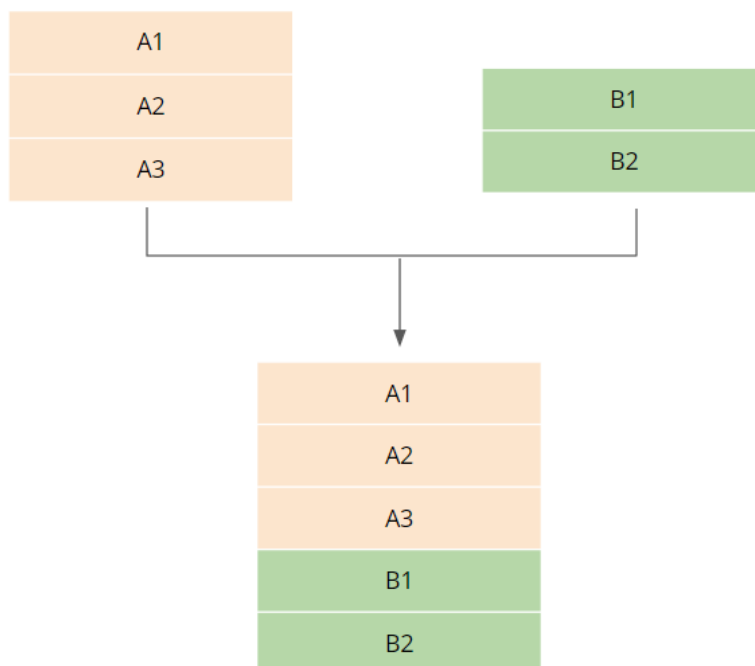
## Merge Mode Options

### Merge Layers

Combines the prims from one pipe with the prims of another pipe.

The default merge behavior is always "A over B" like the 2D Merge. The B input is the main pipe, and the A pipe provides overrides/duplicates. The A inputs are applied in numerical order so higher numbers override lower ones.

From a USD layers perspective, this adds all incoming layers to the layer stack.



Merge Layers: A simple example of merging two stacks.

Merge Layers is recommended as the default behavior for merging in the USD architecture. Different input scenarios provide different results...

### Scenario 1: Different stages are piped in from their own node branches

If you have multiple stages piped into the node from their own node branches (as in the diagram above), the layers will be merged so that they exist separately in the result. For example:

- the geometry of a building in pipe A
- the geometry of a character in pipe B

Merge Layers is most similar to how merging works in the classic 3D system.

### Scenario 2: The same stage is merged back to itself

Merging back to the same stage results in one of the pipes overriding the other as both stages have the same path name. You will not see two instances of the same geometry as in a hierarchical scenegraph prims cannot share the same path. Instead, the stage with the strongest opinion is shown.

Example 1:



- You have geometry from a building in pipe A.
- You have a transformed version of the same building in pipe B.
- You try to GeoMerge pipe A and pipe B.
- Result: pipe with the strongest opinion is shown. In this instance pipe B where we have transformed the building will be shown.

Example 2:

- You have geometry from a building in pipe A.
- You deactivate or hide geometry (using GeoPrune or Geololate) in the building for pipe B.
- You merge pipe A and pipe B using GeoMerge.
- Result: pipe with the strongest opinion is shown. In this instance pipe B where we have either deactivated or hidden the rest of the geometry in the stage.



**Note:** In USD, an 'opinion' is a way of determining how the USD stage is composed. For more information see the [Pixar USD reference](#).

## Merging Geometry From the Same Stage

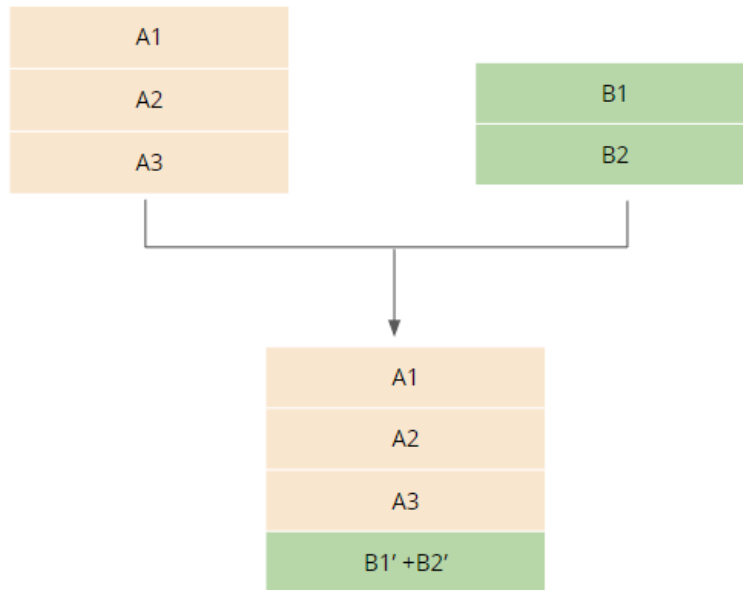
For scenario 2 (above), where you want to merge modified geometry that is an offshoot of the same stage you can use the Geololate node and select **Deisolate** on merge. The Deisolate knob removes any layers created by Geololate nodes allowing you to modify geometry and merge without the rest of the stage being overwritten.

Alternatively, you can fall back on the traditional USD workflow and use a GeoReference node to generate a unique path name for the geometry and so avoid conflicts when merging.

## Duplicate Prims

Allows you to take a prim input and create a copy with a user-defined name.

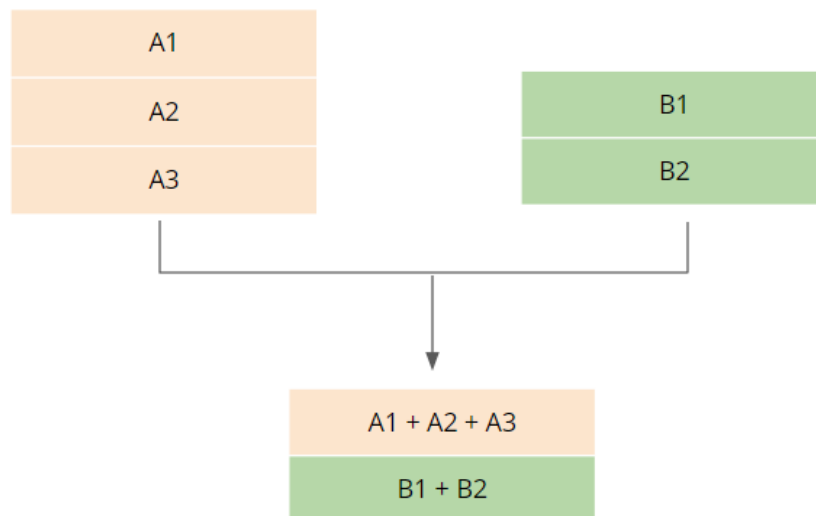
This flattens all the layers on input A and duplicates their root prims. Input B is merged unchanged - only prims that exist on both branches are duplicated.



**Duplicate Prims:** The B input is merged intact and the A input is flattened using duplicate prims (the ' indicates a duplicate).

## Flatten Layers

Flattens layers from each input and adds the flattened layers to the layer stack.

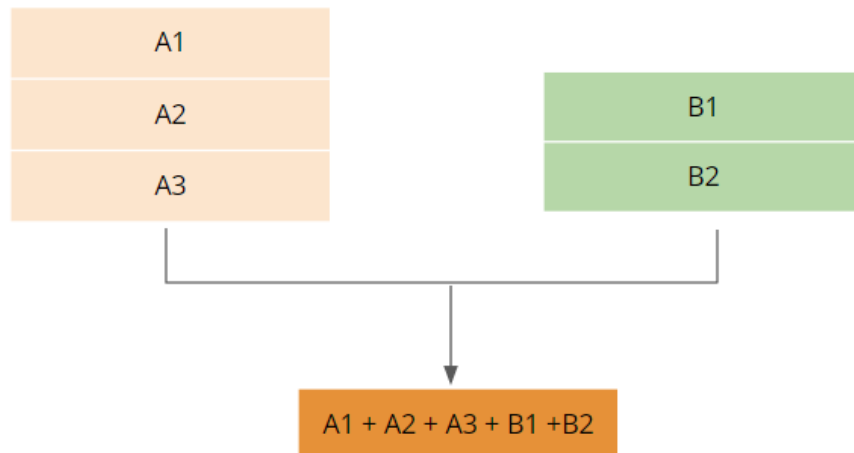


**Flatten Layers:** Incoming layers are flattened and merged to form the result.

Use **Flatten layers** to merge different stages, flatten the layers, and stack the results.

## Flatten to Single Layer

Flattens the layers from each input into one single layer.



**Flatten to Single Layer:** All layers from the inputs are merged into a single layer.

Use Flatten to Single Layer when you want to merge the stages together into a stage containing a single flattened layer.

# GeoNoise

The GeoNoise node warps meshes using a Perlin noise function that creates seemingly random noise. For example, you could use this node to generate animated noise for rippling waves or clouds, or to create a terrain from a flat card.



**Tip:** GeoNoise's classic 3D system equivalent is the [ProceduralNoise](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoNoise     |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Mask         | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the transform to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Noise Type   | mode             | fBm            | <p>Choose the type of noise to use:</p> <ul style="list-style-type: none"> <li>• <b>Turbulence</b> is the same as <b>fBm</b> except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1.</li> <li>• <b>fBm</b> (fractional Brownian motion) runs <b>noise()</b> octave times at different scales to get random numbers between -1 and +1 and then adds them up.</li> </ul>                                                                                                                                                                                                                                                                                           |
| Amount xyz   | amount           | 1, 1, 1        | Allows you to control the amount of noise applied to the prim on each axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               |  <b>Tip:</b> If you want to affect all axes equally, click the single/multiple value button on the right of the <b>Properties</b> panel to gang the xyz controls into a single <b>Amount</b> slider.                                                                                                                                                                                                                                                                                                                                                             |
| Octaves                                                                             | octaves          | 1             | Controls the amount of detail in the noise applied to the prim. Each increment has twice the frequency of the previous number. Lower values produce smoother, large scale noise and higher values more angular, small scale noise.                                                                                                                                                                                                                                                                                                                                                                                                                |
| Lacunarity                                                                          | lacunarity       | 2             | Controls the change in frequency between the specified number of <b>Octaves</b> . Lower values produce coarse noise and higher values finer, small scale noise.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Gain                                                                                | gain             | 0.5           | Controls the amount of noise gain applied to the prim. <b>Gain</b> essentially multiplies the noise effect applied to the prim.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Time                                                                                | time             | 0             | Adjusts the time coordinate on the noise, which produces the effect of noise evolving as time progresses. For example, applying GeoNoise to a GeoCard and adding a keyframe of <b>time=0</b> at frame 1 and <b>time=1</b> at frame 10 produces a wave effect.                                                                                                                                                                                                                                                                                                                                                                                     |
|  | file_menu        | N/A           | Select to import or export a channel file: <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Translate                                                                         | translate        | 0,0,0         | Translates the noise along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Rotate                                                                            | rotate           | 0,0,0         | Rotates the noise around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Scale                                                                             | scaling          | 1,1,1         | Scales the noise on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Uniform                                                                           | uniform_         | 1             | Scales the noise simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                             |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scale           | scale            |               |                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0,0,0         | Skews the noise on the x, y, and z axes.                                                                                                                                                                                                                                             |
| Pivot Translate | pivot_translate  | 0,0,0         | Translates the pivot point and transform handles along the x, y, and z axes without affecting the objects in the scene. You can also translate the pivot point by holding down <b>Ctrl/Cmd</b> and dragging the axis in the 3D Viewer.                                               |
| Pivot Rotate    | pivot_rotate     | 0,0,0         | Rotates the pivot point and transform handles along the x, y, and z axes without affecting the objects in the scene. You can also rotate the pivot point by holding down <b>Ctrl/Cmd</b> and dragging the axis in the 3D Viewer.                                                     |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                      |
| Specify Matrix  | useMatrix        | off           | Enable this control to specify matrix values for the noise you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix          | matrix           | N/A           | <p>The matrix displays values from the noise's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# GeoNormals

The GeoNormals node creates or rebuilds mesh normals. Subdivision surfaces don't generally need normals, but there are occasional cases where creating or modifying normals is beneficial, such as when shaders need detailed lighting information to render correctly.



**Tip:** GeoNormals's classic 3D system equivalent is the [Normals](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | lookat          | <p>An optional input that points all normals at the object connected to this input and adds the <b>Normal</b> xyz values to that position.</p> <div>  <b>Note:</b> <b>Action</b> must be set to <b>lookat</b> for this input to work as expected.         </div> |
|                 | unnamed         | The previous stage in the scene you want to affect.                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoNormals   |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Mask         | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, adds or adjusts the normals for whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.         </div> |
| Action       | action           | unchanged      | <p>Determines what happens to any normals in prims selected by the <b>Mask</b> control:</p> <ul style="list-style-type: none"> <li>• <b>unchanged</b> - any normals specified in the <b>Attribute Name</b> are unaffected.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



| Control (UI)    | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |                  | <ul style="list-style-type: none"> <li>• <b>set</b> - assigns normals specified in the <b>Attribute Name</b> to a constant value set by the <b>Normal</b> control's xyz values.</li> <li>• <b>build</b> - rebuild each normal specified in the <b>Attribute Name</b> based on the surrounding vertices. The <b>Angle Threshold</b> determines the break angle where two faces no longer constitute a smooth surface.</li> <li>• <b>lookat</b> - points all normals specified in the <b>Attribute Name</b> at the object connected to the <b>lookat</b> input and adds the <b>Normal</b> xyz values to that position.</li> <li>• <b>delete</b> - removes the normals specified in the <b>Attribute Name</b> from all geometry groups.</li> </ul> |
| Invert          | invert           | off              | <p>Inverts the added or rebuilt normals.</p> <div>  <b>Note:</b> The <b>Invert</b> control affects all actions, even <b>unchanged</b>.         </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Normal          | normal           | 0, 0, 0          | <p>When <b>Action</b> is equal to <b>set</b> or <b>lookat</b>, assigns a constant xyz value to the normals specified in the <b>Attribute Name</b>.</p> <div>  <b>Note:</b> The <b>Normal</b> xyz values are added to the <b>lookat</b> position.         </div>                                                                                                                                                                                                                                                                                                                                                                                              |
| Angle Threshold | threshold        | 45               | <p>When <b>Action</b> is set to <b>build</b>, sets the angle between two faces at which vertex normals are broken, which creates sharp edges under lighting. A threshold of 0 means all faces are flat, and 180 means all faces are smooth.</p> <div>  <b>Note:</b> <b>Angle Threshold</b> only affects vertex normals.         </div>                                                                                                                                                                                                                                                                                                                       |
| Attribute Name  | N_attrib_name    | primvars:normals | Sets the name of the normal attribute affected by this node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# GeoPoints

The GeoPoints node creates a point cloud from its input. GeoPoints performs similar functions to the classic 3D system DeepToPoints and PositionToPoints nodes, but can also create points from other types of input, such as meshes and particles.



**Tip:** GeoPoints's classic 3D system equivalents are the [DeepToPoints](#) and [PositionToPoints](#) nodes.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                           |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | cam             | An optional input to connect a Camera node to project 2D points back into the 3D space. The image must contain a Z-depth channel if it does not include deep data. |
|                 | src             | An optional input to connect a source 3D object, 2D flat image source, or image containing deep data from which points are created.                                |
|                 | unnamed         | The previous stage in the scene you want to affect.                                                                                                                |
|                 | mat             | The file containing the material you want to apply to the object.                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value           | Function                                                                                                                                                                |
|--------------|------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoPoints    |                  |                         |                                                                                                                                                                         |
| Path         | prim_path        | {parent}/<br>{nodename} | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoPoint1 or GeoPoints5. |
| Parent Type  | parentPrimType   | Xform                   | Sets the type of prim to create if there are missing ancestors in the path.                                                                                             |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Points         | points_path      | none          | <p>Specifies the prim names from which points are created. You can use standard glob-style variables, such as <code>/*</code>, to create masks or use individual prim names separated by spaces. For example, <code>/GeoCube1 /GeoCard3</code> creates points from only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to specify source prims. </div> |
| Surface Points | P_channel        | none          | Sets the channel from which the point positions are taken.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Surface Normal | N_channel        | none          | Sets the channel from which the point normals are taken.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Point Size     | point_size       | 0.01          | Controls the size of the points in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Depth Channel  | depth_channel    | depth.Z       | Sets the channel from which depth information is taken.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Depth Type     | depth_type       | 1/Z           | <p>Sets how the depth information is converted into the distance between the camera and objects:</p> <ul style="list-style-type: none"> <li>• <b>Z</b> - depth is the input depth.</li> <li>• <b>1/Z</b> - depth is 1 divided by input depth. Nuke and RenderMan use this depth calculation by default.</li> <li>• <b>-Z</b> - depth is -input depth.</li> <li>• <b>-1/Z</b> - depth is -1 divided by input depth. Maya uses this depth calculation by default.</li> </ul>                                                 |

# GeoPointsToMesh

The GeoPointsToMesh node (NukeX only) uses geometry normals to generate a mesh from a point cloud using Poisson Surface Reconstruction.



**Note:** Based on the SGP 2006 paper, *Poisson Surface Reconstruction* by Michael Kazhdan, Matthew Bolitho, and Hugues Hoppe. The original source code and paper can be found at <https://www.cs.jhu.edu/~misha/Code/PoissonRecon>



**Tip:** GeoPointsToMesh's classic 3D system equivalent is the [PoissonMesh](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoPointsToMesh |                  |               |                                                                                                                                                                                                                                                                                                             |
| Path            | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoPointsToMesh1 or GeoPointsToMesh5.                                                                                                                        |
| Parent Type     | parent_type      | Xform         | Sets the type of prim to create if there are missing ancestors in the path. <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist. </div> |
| Mask            | mask_patterns    | none          | Specifies the mask pattern to match the prim names from which the mesh is created. You can use standard glob-style variables, such as <b>/*</b> , to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.      |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               |  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Use Selection | use_selection    | on            | When enabled, selection flags from GeoSelect nodes further up the tree are used to create the mesh.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Filtering     | use_filtering    | on            | When enabled, filter the new mesh so that only faces with normals similar to those of the input are created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Depth         | depth            | 8             | <p>Sets the maximum depth of the tree that is used for surface reconstruction. The <b>Depth</b> value must be an integer with a maximum value of 10, because each increment increases the solver's potential memory usage by 8 times, so keep it as low as possible.</p> <p>You can also think of it as the density of the voxels used by the solver. Running at depth <b>d</b> corresponds to solving on a voxel grid whose resolution is no larger than <math>2^d \times 2^d \times 2^d</math>.</p> <div>  <b>Note:</b> The reconstructor adapts the octree to the sampling density, so the specified reconstruction depth is only an upper bound.         </div> |
| Scale         | scale            | 1.25          | Specifies the ratio between the diameter of the cube used for reconstruction and the diameter of the samples' bounding cube.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Solver Divide | solver_divide    | 8             | Specifies the depth at which a block Gauss-Seidel solver is used to solve the Laplacian equation. Using this parameter helps reduce the memory overhead at the cost of a small increase in reconstruction time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               |  <b>Tip:</b> We found that for reconstructions of <b>Depth</b> $\geq 9$ , a <b>Solver Divide</b> of <b>7</b> or <b>8</b> can greatly reduce memory usage.                                                                                                                                                                                                                                             |
| Iso Divide       | iso_divide       | 8             | <p>Specifies the depth at which a block iso-surface extractor is used to extract the iso-surface. <b>Iso Divide</b> helps reduce the memory overhead at the cost of a small increase in extraction time.</p> <div>  <b>Tip:</b> We found that for reconstructions of <b>Depth</b> <math>\geq 9</math>, an <b>Iso Divide</b> of <b>7</b> or <b>8</b> can greatly reduce memory usage.           </div> |
| Samples Per Node | samples_per_node | 1             | <p>Specifies the minimum number of sample points that fall within an octree node as the octree construction is adapted to sampling density.</p> <p>For noise-free samples, use small values in the range 1.0 - 5.0. For more noisy samples, larger values in the range 15.0 - 20.0 may provide a smoother, noise-reduced reconstruction.</p>                                                                                                                                           |
| Confidence       | confidence       | off           | <p>When enabled, the reconstructor uses the size of the normals as confidence information.</p> <p>When disabled, all normals are normalized to have a unit-length prior to reconstruction.</p>                                                                                                                                                                                                                                                                                         |

# GeoPrune

The GeoPrune node is used to show and hide objects in the scene or deactivate and active objects in the scene. Hide causes the specified objects to become invisible, whereas deactivate causes the specified objects to behave as though they haven't been added to the scene at all.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)     | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoPrune         |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Mask             | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to prune from the scene. The default mask, <b>{lastmodified}</b>, applies the prune to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the prune effect to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Invert Selection | invert_mask      | off            | <p>When turned off the prune method is only applied to the objects specified in the <b>Mask</b> control.</p> <p>When turned on, the prune method is applied to all objects in the scene not specified in the <b>Mask</b> control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Method           | method           | Hide           | <p>Sets the prune method to apply to objects:</p> <ul style="list-style-type: none"> <li>• <b>Hide</b> - hides the objects specified by the <b>Mask</b> pattern. Hidden objects behave as if they are invisible.</li> <li>• <b>Show</b> - shows the objects specified by the <b>Mask</b> pattern.</li> <li>• <b>Deactivate</b> - deactivates the objects specified by the <b>Mask</b> pattern. Deactivated objects behave as if they were</li> </ul>                                                                                                                                                                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>never added to the scene.</p> <ul style="list-style-type: none"> <li>• <b>Activate</b> - Activates the objects specified by the <b>Mask</b> pattern. Activated objects behave normally.</li> </ul> |

# GeoRadialWarp

The GeoRadialWarp node warps meshes away from a center point. You can use the **Rotation Center** control in the **Properties** to set the location of the warp center or drag the center widget around in the Viewer to set the extent of the warp.



**Tip:** GeoRadialWarp's classic 3D system equivalent is the [RadialDistort](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)  | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                    |
|---------------|------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoRadialWarp |                  |                |                                                                                                                                                                                                                                                                                                             |
| Mask          | mask_patterns    | {lastmodified} | Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b> , applies the warp to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <p>/*, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Distortion          | distortion       | 0             | Sets the amount of distortion. Values below 0 produce a barrel distortion, whereas values above 0 produce a pin-cushion distortion. If you set the value to 0, the geometry is not distorted.                                                                                                                                                                                             |
| Power Bias          | power_bias       | 4             | Sets the magnitude of the distortion. The higher the value, the more distorted the object becomes.                                                                                                                                                                                                                                                                                        |
| Rotation Center xyz | center           | 0, 0, 0       | <p>Moves the rotation center point of the warp on the xyz axes.</p> <div>  <b>Tip:</b> You can also move the center point by dragging the widget in the Viewer. </div>                                                                                                                                 |
| Scale xyz           | scale            | 1, 1, 1       | Sets the amount of distortion in the x, y, or z directions.                                                                                                                                                                                                                                                                                                                               |
| Preserve Center     | preserve_center  | on            | <p>When enabled, keep the object centered in its original place in 3D space.</p> <p>When disabled, allow the object to be offset from the origin.</p>                                                                                                                                                                                                                                     |

# GeoReference

The GeoReference node creates a new instance of an object, essentially allowing you to duplicate whatever you want. An instance is a light-weight reference to another object, rather than a copy of an object. You can use the **File Path** to reference a file on disk or the **Prim Path** to reference an object in the scene graph.

- **File Path** references an object from an external file and you can give the object a different **Path** so that you can import instances of the same object several times. If you use GeoImport, the **Path** to the object can't be changed, so you would overwrite the object each time you import it.
- **Prim Path** creates an instance of an existing object in the scene and gives it a new **Path**. This is an easy way to create instances of objects in the 3D system. Bear in mind that GeoReference also applies the transforms on the referenced object to the instance, so it appears in the scene in the same place as the original object.

See also [GeoImport](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                          |
|-----------------|-----------------|-------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to reference.            |
|                 | mat             | The file containing the material you want to apply to the object. |

| Control (UI)   | Knob (Scripting)    | Default Value           | Function                                                                                                                                                                                                                                       |
|----------------|---------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoReference   |                     |                         |                                                                                                                                                                                                                                                |
| Path           | prim_path           | {parent}/<br>{nodename} | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoReference1 or GeoReference5.                                                                 |
| Parent Type    | parent_<br>primType | Xform                   | Sets the type of prim to create if there are missing ancestors in the path.                                                                                                                                                                    |
| Reference Type | reference_<br>type  | Reference               | Sets the type of reference to load: <ul style="list-style-type: none"> <li>• <b>Reference</b> - load the object immediately.</li> <li>• <b>Payload</b> - payloads can be delayed to stop heavy geometry loading until you're ready.</li> </ul> |

| Control (UI)   | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                     |               |  <b>Note:</b> Payloads are loaded by default and the payload icon  at the top of the Scene Graph tab is orange. If you want to defer any object set as payload, click the payload icon  so that it turns gray. |
| Operation      | reference_operation | Prepend Back  | Specifies how the referenced object is ordered in the reference list, which can affect how the object interacts with other objects.                                                                                                                                                                                                                                                                                                                                   |
| File Path      | file_path           | none          | The path to the external file containing the object you're referencing.                                                                                                                                                                                                                                                                                                                                                                                               |
| Prim Path      | ref_prim_path       | none          | The path to the object you want to reference. If you leave this option blank, the target file's default object is used, which is set by the file's author.                                                                                                                                                                                                                                                                                                            |
| Reload         | reload              | N/A           | Click to reload the target file or referenced prim location.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Time Remapping |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Offset         | time_offset         | 0             | Offsets the USD prim animation by this amount                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Scale          | time_scale          | 1             | Scales the referenced prim animation by this amount. Values between 0 and 1 speed up the animation and values higher than 1 slow it down.                                                                                                                                                                                                                                                                                                                             |

# GeoRevolve

The GeoRevolve node creates a cylinder or sphere object in the scene with a prim path variable **{parent}/{nodename}** which is equal to the node name, such as /GeoRevolve1 or /GeoRevolve5. You can change the prim path to update the scene graph as required and set the object's **Kind**, **Purpose**, and **Visibility**.

Nuke only uses **Kinds** with the [GeoDrawMode](#) node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to

follow the conventions on the use of **Kind** to create properly-constructed USD stages if you intend to export the scene for use in your pipeline.

The **Purpose** dropdown controls the type of geometry this object represents. The Viewer node's **Properties** > **3D** tab controls which purposes are visible in the 3D Viewer: **Render**, **Proxy**, or **Guide**. The **default** option essentially means 'always render this object', it has no special properties as far as renderers are concerned.

**Visibility** affects whether the object is visible or invisible when you export the scene. The default value is **inherited**, meaning the object's visibility is controlled by its parent object. The **Shape** control determines whether a **Cylinder** or **Sphere** object is created.



**Note:** You can also create GeoSphere and GeoCylinder nodes in the Node Graph, but their node class is always GeoRevolve. Only the node name is changed in the **Properties** panel and scene graph.

You can set the object's appearance using the color and opacity controls and the rows/columns settings determine how many vertices the object is split into. Setting the **Mesh Type** to **shared vertices** and choosing a **Subdivision** option allows you to smooth the object. The level of subdivision can be adjusted using the Viewer node's **Properties** on the **3D** tab under **Refine Level**. The **Refine Level** only affects the Viewer output, not the final rendered scene.

The **Transform** tab allows you to translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node.

See also [GeoCard](#) and [GeoCube](#).



**Tip:** GeoRevolve's classic 3D system equivalents are the [Cylinder](#) and [Sphere](#) nodes.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                          |
|-----------------|-----------------|-------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect.               |
|                 | mat             | The file containing the material you want to apply to the object. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoRevolve   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Path         | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoRevolve1 or GeoRevolve5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Parent Type  | parent_type      | Xform         | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Kind         | kind             | group         | <p>Sets the <b>Kind</b> associated with this object. Nuke only uses <b>Kinds</b> with the <a href="#">GeoDrawMode</a> node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of <b>Kind</b> to create properly-constructed USD stages if you intend to export the scene for use in your pipeline. The <b>model</b> option is valid, but should not be used in most cases:</p> <ul style="list-style-type: none"> <li>• <b>model</b> - the root prim in the scene, which is a superclass of group and component.</li> <li>• <b>assembly</b> - used to denote an important group in the scene.</li> <li>• <b>group</b> - a container for other kinds.</li> <li>• <b>component</b> - a leaf kind, which cannot contain other kinds apart from subcomponents.</li> <li>• <b>subcomponent</b> - a special leaf kind for use in components.</li> </ul> |
| Purpose      | purpose          | default       | <p>Sets the object's purpose, which can be used to control how a scene is rendered:</p> <ul style="list-style-type: none"> <li>• <b>default</b> - the object has no particular purpose and is rendered by default.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>render</b> - the object is the full resolution version for use when rendering the scene.</li> <li>• <b>proxy</b> - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times.</li> <li>• <b>guide</b> - the object is not rendered, but is visible in the Viewer for reference.</li> </ul> <div>  <b>Note:</b> The <b>render</b>, <b>proxy</b>, and <b>guide</b> purposes are only displayed in the 3D Viewer when they are enabled in the Viewer <b>Properties</b> in the <b>3D</b> tab. </div> |
| Visibility      | visibility       | inherited     | <p>Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance.</p> <ul style="list-style-type: none"> <li>• <b>inherited</b> - the object's visibility is controlled by its parent.</li> <li>• <b>invisible</b> - the object and its descendants are invisible in the scene.</li> </ul>                                                                                                                                                                                                                                                                                                                     |
| Display Color   | display_color    | 1             | Sets the color applied to the faces of the object. You can use the sliders, color picker, or colorwheel to select the required color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Display Opacity | display_opacity  | 1             | Sets the opacity applied to the faces of the object, where 1 is fully opaque and 0 is fully transparent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Double Sided    | double_sided     | off           | When enabled, the selected color and opacity is applied to both sides of the object's faces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Shape           | shape            | Cylinder      | Determines the shape of the object, <b>Cylinder</b> or <b>Sphere</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> You can also create GeoSphere and GeoCylinder nodes in the Node Graph, but their node class is always GeoRevolve. Only the node name is changed in the <b>Properties</b> panel and scene graph.                           |
| Rows/Columns | rows             | 30            | Sets the number of rows on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                     |
|              | columns          | 30            | Sets the number of columns on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                  |
| Radius       | radius           | 1             | Sets the radius and height of the cylinder or sphere, depending on the <b>Shape</b> you chose.                                                                                                                                                                                                                           |
| Height       | height           | 1             |                                                                                                                                                                                                                                                                                                                          |
| U Extent     | u_extent         | 360           | <p>Sets the extent to which the input image wraps around the object horizontally without extrapolating from the image edges.</p> <p>For example, a value of 180 wraps the input image 90° around the sphere on both sides of the y axis and closes any remainder by extrapolating from the edges of the input image.</p> |
| V Extent     | v_extent         | 180           | <p>Sets the extent to which the input image wraps around the object vertically without extrapolating from the image edges.</p> <p>For example, a value of 90 wraps the input image 45° around the sphere on both sides of the x axis and closes any remainder by extrapolating from the edges of the input image.</p>    |
| Close Top    | close_top        | on            | When on, the top of the object is closed.                                                                                                                                                                                                                                                                                |
| Close Bottom | close_bottom     | on            | When on, the bottom of the object is closed.                                                                                                                                                                                                                                                                             |

| Control (UI)  | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UV Top Cap    | uv_top           | on                | <p>When <b>Close Top</b> is on and <b>UV Top Cap</b> is on, the object's UV patches extend into the top cap. When <b>UV Top Cap</b> is off, the object's UV patches do not extend onto the cap.</p> <div>  <b>Note:</b> When <b>Close Top</b> is off, <b>UV Top Cap</b> has no effect. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| UV Bottom Cap | uv_bottom        | on                | <p>When <b>Close Bottom</b> is on and <b>UV Bottom Cap</b> is on, the object's UV patches extend into the bottom cap. When <b>UV Bottom Cap</b> is off, the object's UV patches do not extend onto the cap.</p> <div>  <b>Note:</b> When <b>Close Bottom</b> is off, <b>UV Bottom Cap</b> has no effect. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Mesh Type     | mesh_type        | separate vertices | <p>Determines how vertices and faces are affected by the <b>Subdivision</b> control:</p> <ul style="list-style-type: none"> <li>• <b>separate vertices</b> - edge vertices are separated so that they are not affected by <b>Subdivision</b>.</li> <li>• <b>shared vertices</b> - vertices are shared between the faces and end caps so that when <b>Subdivision</b> is enabled, the chosen smoothing method is applied.</li> </ul> <div>  <b>Note:</b> The level of subdivision can be adjusted using the Viewer node's <b>Properties</b> on the <b>3D</b> tab under <b>Refine Level</b>. The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene. </div> <ul style="list-style-type: none"> <li>• <b>separate faces</b> - separate face meshes are added to the scene graph for the body and end caps. Enabling <b>Subdivision</b> has no effect.</li> </ul> |



| Control (UI)  | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normals       | normals              | face-vertex   | <p>Sets the type of normals generated:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no normals are generated on the base prim, but may be generated by subdivision.</li> <li>• <b>face-vertex</b> - normals are generated for face vertices.</li> </ul> <div>  <b>Tip:</b> Normals are not displayed in the Viewer by default. If you want to display normals in the Viewer, press <b>S</b> over the Viewer, go to the <b>3D</b> tab in the Viewer <b>Properties</b> panel, and enable the <b>show</b> &gt; normals options by clicking the required buttons. See the <a href="#">Viewer</a> node for more information. </div> |
| Subdivision   | subdivision_scheme   | none          | <p>Sets the subdivision method to apply when <b>Mesh Type</b> is set to <b>shared vertices</b>:</p> <ul style="list-style-type: none"> <li>• <b>catmullClark</b></li> <li>• <b>loop</b></li> <li>• <b>bilinear</b></li> <li>• <b>none</b></li> </ul> <div>  <b>Note:</b> The level of subdivision can be adjusted using the Viewer node's <b>Properties</b> on the <b>3D</b> tab under <b>Refine Level</b>. The <b>Refine Level</b> only affects the Viewer output, not the final rendered scene. </div>                                                                                                                                   |
| Boundary      | interpolate_boundary | none          | <p>Controls where interpolation is applied at boundaries between faces:</p> <ul style="list-style-type: none"> <li>• <b>none</b></li> <li>• <b>edge only</b></li> <li>• <b>edge and corner</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Transform Tab |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                    |
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                  |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                   |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                    |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                     |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                     |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Specify Matrix  | use_matrix       | off           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                           |
| Matrix          | matrix           | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                        |

# GeoScene

The GeoScene node combines two or more objects or stacks of objects into a single output so you can pass the scene to a render node, such as ScanlineRender or RayRender. GeoScene is functionally equivalent to GeoMerge and does not have any node-specific properties.



**Note:** Prims downstream from GeoScene with **Mask** set to **{lastmodified}** inherit from the strongest layer, the layer connected to the highest numbered input.

See also [GeoMerge](#).



**Tip:** GeoScene's classic 3D system equivalent is the [Scene](#) node.

## Inputs and Controls

| Connection Type | Connection Name   | Function                                                       |
|-----------------|-------------------|----------------------------------------------------------------|
| Input           | [numbered inputs] | Combines any new 3D system objects you want to merge together. |

# GeoScope

The GeoScope node creates a single Scope object, which can be used for grouping objects together to organize the scene graph.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                          |
|-----------------|-----------------|-------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect.               |
|                 | mat             | The file containing the material you want to apply to the object. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoScope     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Path         | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as GeoScope1 or GeoScope5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Parent Type  | parent_type      | Xform         | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Kind         | kind             | group         | <p>Sets the <b>Kind</b> associated with this object. Nuke only uses <b>Kinds</b> with the <b>GeoDrawMode</b> node, which allows you to display complicated geometry in a simplified form, such as a bounding box or crossed cards, to load scenes faster. It's also good practice to follow the conventions on the use of <b>Kind</b> to create properly-constructed USD stages if you intend to export the scene for use in your pipeline. The <b>model</b> option is valid, but should not be used in most cases:</p> <ul style="list-style-type: none"> <li>• <b>model</b> - the root prim in the scene, which is a superclass of group and component.</li> <li>• <b>assembly</b> - used to denote an important group in the scene.</li> <li>• <b>group</b> - a container for other kinds.</li> <li>• <b>component</b> - a leaf kind, which cannot contain other kinds</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>apart from subcomponents.</p> <ul style="list-style-type: none"> <li>• <b>subcomponent</b> - a special leaf kind for use in components.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Purpose      | purpose          | default       | <p>Sets the object's purpose, which can be used to control how a scene is rendered:</p> <ul style="list-style-type: none"> <li>• <b>default</b> - the object has no particular purpose and is rendered by default.</li> <li>• <b>render</b> - the object is the full resolution version for use when rendering the scene.</li> <li>• <b>proxy</b> - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times.</li> <li>• <b>guide</b> - the object is not rendered, but is visible in the Viewer for reference.</li> </ul> <div>  <b>Note:</b> The <b>render</b>, <b>proxy</b>, and <b>guide</b> purposes are only displayed in the 3D Viewer when they are enabled in the Viewer <b>Properties</b> in the <b>3D</b> tab. </div> |
| Visibility   | visibility       | inherited     | <p>Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance.</p> <ul style="list-style-type: none"> <li>• <b>inherited</b> - the object's visibility is controlled by its parent.</li> <li>• <b>invisible</b> - the object and its descendants are invisible in the scene.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# GeoScript

The GeoScript node allows you to add a layer to the scene by typing USD code into the text editor manually.



**Tip:** If you want to view the previous USD stage in text form, use the [GeoViewScene](#) node.

For example, to add a layer containing simple, transformable cube geometry with a size of 4 units:

USD Source

```
1 | #usda 1.0
2 |
3 | def Xform "Cube"
4 |   {
5 |     def Cube "box" {
6 |       double size = 4.0
7 |     }
8 |   }
```

Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI) | Knob (Scripting) | Default Value      | Function                                                                                                            |
|--------------|------------------|--------------------|---------------------------------------------------------------------------------------------------------------------|
| GeoScript    |                  |                    |                                                                                                                     |
| Source       | usd_source       | dependent on stage | Displays the USD stage in text form and allows you to add a layer by typing USD code into the text editor manually. |
| Reload       | reload           | N/A                | Click to reload the source panel if the stage has changed.                                                          |

GeoSelector

The GeoSelector node allows you to store a face or vertex selection in the Viewer and then reapply the selection to another object. Each selection is stored using the prim's scene graph location, so you can store as many selections as required as long as each selection has a unique path. For example, an 8x8 card with its top row of faces selected and another 8x8 card with all faces selected:

```
{ /GeoCard1/Card faces 8 1 56 0 facWei 8 1 56 0 }
{ /GeoCard2/Card faces 64 1 facWei 64 1 }
```



**Tip:** GeoSelector's classic 3D system equivalent is the [GeoSelect](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)      | Knob (Scripting)  | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|-------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoSelector       |                   |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Mask              | mask_patterns     | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, saves a selection from whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.</p> <div>  <p><b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.</p> </div> |
| Save Selection    | save_selection    | N/A            | Click to save the currently selected faces or vertices, dependent on the 3D Viewer mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Restore Selection | restore_selection | N/A            | Click to restore the selected faces or vertices saved in the node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## GeoTransform



The GeoTransform node applies transforms to objects in a 3D scene, including translate, rotate, scale, and skew. The **Mask** property controls the objects that are affected by the node, which allows you to transform the entire scene or only certain objects. The default mask, **{lastmodified}**, applies the transform to whatever was changed by the previous node. A simple way to think of it is that **{lastmodified}** affects the node above, which is just the GeoRevolve node in the video example. You can enter as many object paths as required, such as `/GeoCube1` and `/GeoRevolve1`, and then adjust the transform controls to affect just those objects. You can also use simple expressions, such as `/GeoC*` to affect anything with a path beginning "GeoC" or `/*` (forwardslash asterisk) to affect everything in the scene.

In larger scenes you can use the Scene Graph or eye dropper in the **Properties** panel to select objects to transform. To use the Scene Graph, navigate to the object you want to transform and drag the path into the GeoTransform **Mask** control. You can drag as many individual objects as you like into the **Mask** control as long as each path is separated by a space or you can multi-select objects and drag them into the **Mask** control all at once.

To use the eye dropper, click the  dropper icon in the **Properties** panel and then click the required object in the 3D Viewer to add it to the **Mask** control. To make multiple selections, hold **Ctrl/Cmd+Shift** and click the required objects in the 3D Viewer.

GeoTransform also includes two optional inputs, **look** and **axis**, to control transforms automatically:

- If the **look** input is connected, the transformed 3D object is automatically rotated to point towards the **look** object, even if it is moved. You can change the axis on which the object rotates to look at the camera on the **Look** tab.
- If the **axis** input is connected, the transform controls on the Axis node override the corresponding controls on the GeoTransform node.



**Tip:** GeoTransform's classic 3D system equivalent is the [TransformGeo](#) node.

# Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                      |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to translate, rotate, scale, or skew. The <b>Mask</b> control determines which objects in the scene are affected, by default <b>{lastmodified}</b> . |
|                 | look            | An optional input where you can connect a 3D object that the                                                                                                                                  |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | <p>transformed 3D object should face. If a <b>look</b> input exists, the transformed 3D object is automatically rotated to point towards the <b>look</b> input whenever the <b>look</b> input is moved.</p> <p>This can be useful, for example, if you have a 2D matte painting mapped to a Card in your scene. The <b>look</b> input ensures that the plane of the painting always faces the camera, regardless of the camera position, and maintains the illusion depicted by the painting.</p> |
|                 | axis            | <p>An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on the GeoTransform node.</p> <p>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</p>                                                                                                                       |

| Control (UI)     | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoTransform Tab |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Mask             | mask_ patterns   | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the transform to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                           |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | <p>Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                               |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rotation Order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                     |
| Translate       | translate        | 0,0,0         | Translates the selection along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                          |
| Rotate          | rotate           | 0,0,0         | Rotates the selection around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                         |
| Scale           | scaling          | 1,1,1         | Scales the selection on the x, y, and z axes.                                                                                                                                                                                          |
| Uniform Scale   | uniform_scale    | 1             | Scales the selection simultaneously on the x, y, and z axes.                                                                                                                                                                           |
| skew            | skew             | 0,0,0         | Skews the selection on the x, y, and z axes.                                                                                                                                                                                           |
| Pivot Translate | pivot_translate  | 0,0,0         | Translates the pivot point and transform handles along the x, y, and z axes without affecting the objects in the scene. You can also translate the pivot point by holding down <b>Ctrl/Cmd</b> and dragging the axis in the 3D Viewer. |
| Pivot Rotate    | pivot_rotate     | 0,0,0         | Rotates the pivot point and transform handles along the x, y, and z axes without affecting the objects in the scene. You can also rotate the pivot point by holding down <b>Ctrl/Cmd</b> and dragging the axis in the 3D Viewer.       |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                        |
| Specify Matrix  | useMatrix        | off           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                            |
| matrix          | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those</p>                  |

| Control (UI)                                                                              | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                           |                      |               | values, for example, if you wanted to align objects in a scene.                                                                                                                                                                                                                                                                                                                           |
| Prim Transform Order                                                                      | xform_op_order       | Prepend       | <p>Determines when transforms should be applied to the objects specified in the <b>Mask</b> control:</p> <ul style="list-style-type: none"> <li>• <b>Prepend</b> - applies the transforms from this node before any other transforms applied to the object.</li> <li>• <b>Append</b> - applies the transforms from this node after any other transforms applied to the object.</li> </ul> |
| Look Tab - controls on this tab are only enabled when the <b>look</b> input is connected. |                      |               |                                                                                                                                                                                                                                                                                                                                                                                           |
| Look Axis                                                                                 | look_axis            | +Z            | Defines the axis around which the 3D object is rotated to face the <b>look</b> input.                                                                                                                                                                                                                                                                                                     |
| Rotate X                                                                                  | look_rotate_x        | on            | Determines whether the rotation occurs around the X axis. Note that for the rotation to truly "look at" the <b>look</b> input, all three of these options must be activated.                                                                                                                                                                                                              |
| Rotate Y                                                                                  | look_rotate_y        | on            | Determines whether the rotation occurs around the Y axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options.                                                                                                                                                                                                                |
| Rotate Z                                                                                  | look_rotate_z        | on            | Determines whether the rotation occurs around the Z axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options.                                                                                                                                                                                                                |
| Look Strength                                                                             | look_strength        | 1             | Determines to what extent the 3D object rotates to the new orientation. The smaller the value, the less the object is rotated. Setting the value to 0 produces no rotation.                                                                                                                                                                                                               |
| Use Quaternions                                                                           | look_use_quaternions | off           | Uses an alternate scheme to calculate the <b>look</b> rotation. This option may be useful to smooth out erratic rotations along the look axis.                                                                                                                                                                                                                                            |

# GeoTrilinearWarp

The GeoTrilinearWarp node warps meshes by moving the corners of its bounding box separately to create the warp.



**Tip:** GeoTrilinearWarp's classic 3D system equivalent is the [Trilinear](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to affect. |

| Control (UI)         | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoTrilinearWarp     |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Mask                 | mask_patterns    | {lastmodified} | Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b> , applies the warp to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b> , to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> applies the transform to only those prims. <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Reset Shape To Input | reset_shape      | N/A            | Cancels your changes and resets the input to its original shape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Copy                 | copy_shape       | N/A            | Copies the current positions of the bounding box corners ( <b>p0-p7</b> ) into a temporary buffer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

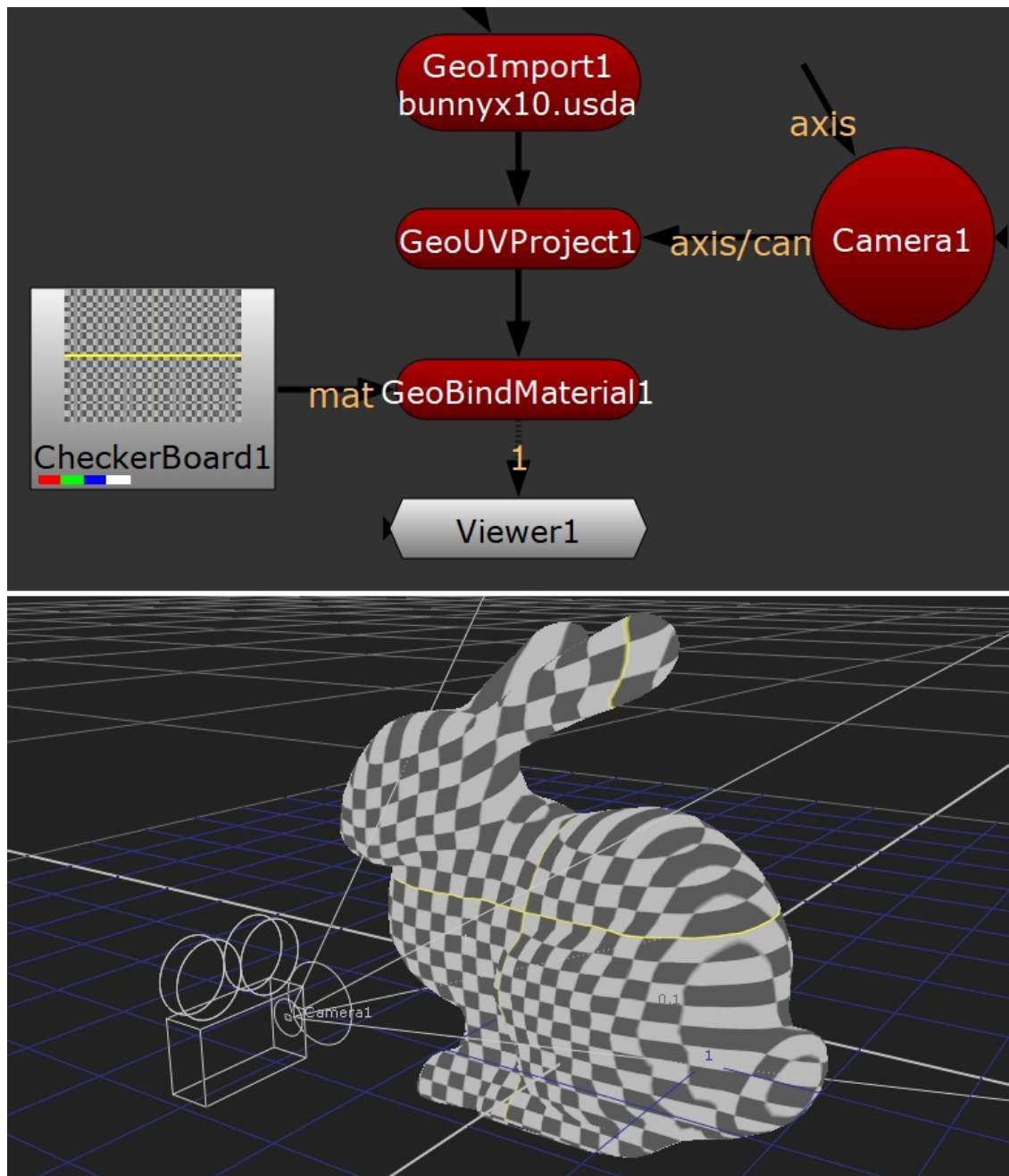
| Control (UI) | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                              |
|--------------|------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Paste        | paste_shape      | N/A              | Pastes previously copied positions of the bounding box corners ( <b>p0-p7</b> ).                                                                                                                      |
| Set Key      | set_key_shape    | N/A              | Sets keys for the positions of all the bounding box corners ( <b>p0-p7</b> ) on the current frame. This is the same as selecting <b>Set key</b> from the animation menu next to each of the controls. |
| Delete Key   | delete_key_shape | N/A              | Deletes the keys on the positions of all the bounding box corners ( <b>p0-p7</b> ) on the current frame.                                                                                              |
| Delete Anim  | del_anim_shape   | N/A              | Deletes the keys on the positions of all the bounding box corners ( <b>p0-p7</b> ) on all frames.                                                                                                     |
| P0 xyz       | p0               | -0.5, -0.5, -0.5 | Sets the x, y, and z coordinates for the <b>p0</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P1 xyz       | p1               | -0.5, 0.5, -0.5  | Sets the x, y, and z coordinates for the <b>p1</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P2 xyz       | p2               | 0.5, 0.5, 0.5    | Sets the x, y, and z coordinates for the <b>p2</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P3 xyz       | p3               | 0.5, -0.5, -0.5  | Sets the x, y, and z coordinates for the <b>p3</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P4 xyz       | p4               | -0.5, -0.5, 0.5  | Sets the x, y, and z coordinates for the <b>p4</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P5 xyz       | p5               | -0.5, 0.5, 0.5   | Sets the x, y, and z coordinates for the <b>p5</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |
| P6 xyz       | p6               | 0.5, 0.5, 0.5    | Sets the x, y, and z coordinates for the <b>p6</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                                          |

| Control (UI)              | Knob (Scripting) | Default Value    | Function                                                                                                                                                                       |
|---------------------------|------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P7 xyz                    | p7               | 0.5, -0.5, 0.5   | Sets the x, y, and z coordinates for the <b>p7</b> corner of the bounding box. You can also adjust these by dragging the corresponding vertex in the Viewer.                   |
| Source Box Tab            |                  |                  |                                                                                                                                                                                |
| Use Incoming Bounding Box | src_use_bbox     | on               | By default, the node warps the bounding box of the input object. If you'd rather warp a custom bounding box, uncheck this and use the controls below to define the custom box. |
| Reset Source Box To Input | reset_src_shape  | N/A              | When <b>Use Incoming Bounding Box</b> is disabled, cancels any changes you've made to the custom bounding box and resets it to the original settings taken from the input.     |
| Box                       | src_color        | red              | When <b>Use Incoming Bounding Box</b> is disabled, sets the color of the custom bounding box in the 3D Viewer.                                                                 |
| Source 0 xyz              | src0             | -0.5, -0.5, -0.5 | When <b>Use Incoming Bounding Box</b> is disabled, sets the x, y, and z coordinates for one of the two custom bounding box corners you can adjust.                             |
| Source 1 xyz              | src1             | 0.5, 0.5, 0.5    | When <b>Use Incoming Bounding Box</b> is disabled, sets the x, y, and z coordinates for one of the two custom bounding box corners you can adjust.                             |

# GeoUVProject

The GeoUVProject node modifies or creates texture coordinates on a mesh using a projection from a Camera or an Axis node. If the object already has UV coordinates, this node replaces them. This simple example shows a CheckerBoard material projected onto a bunny using a Camera node to position the material.





**Tip:** GeoUVProject's classic 3D system equivalent is the [UVProject](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                       |
|-----------------|-----------------|----------------------------------------------------------------|
| Input           | axis/cam        | The Axis or Camera node controlling the projection attributes. |
|                 | unnamed         | The previous stage in the scene you want to affect.            |

| Control (UI) | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoUVProject |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Mask         | mask_patterns    | {lastmodified} | <p>Specifies the mask pattern to match the prim names to affect. The default mask, <b>{lastmodified}</b>, applies the effect to whatever was changed by the previous node. A simple way to think of it is that <b>{lastmodified}</b> affects the node above. You can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube 1 /GeoCard3</b> applies the effect to only those prims.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| Projection   | projection       | Perspective    | <p>Sets the projection type for rendered objects. Usually, it's best to select a type that's close to the object's surface shape.</p> <ul style="list-style-type: none"> <li>• Off</li> <li>• Perspective</li> <li>• Planar</li> <li>• Spherical</li> <li>• Cylindrical</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                   |
|----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               |  <b>Note:</b> When <b>Projection</b> is set to <b>off</b> , the GeoUVProject node is essentially disabled.                                                                                                                                                                |
| Plane                | plane            | XY            | <p>Sets the projection direction to project the texture image along axes:</p> <ul style="list-style-type: none"> <li>• XY</li> <li>• YZ</li> <li>• ZX</li> </ul>  <b>Note:</b> This dropdown menu is only available if you selected <b>planar</b> as the projection type. |
| Project On           | project_on       | Both          | <p>Sets which surfaces of a 3D object the projection falls on through the camera:</p> <ul style="list-style-type: none"> <li>• Both</li> <li>• Front</li> <li>• Back</li> </ul>                                                                                                                                                                            |
| View Frustum Culling | frustum_culling  | off           | When enabled, the GeoUVProject node affects only the vertices inside the camera view frustum. Any vertices outside the view frustum are not affected and they retain their original uv coordinates.                                                                                                                                                        |
| Invert U             | u_invert         | off           | When enabled, the u coordinates are inverted on the horizontal axis.                                                                                                                                                                                                                                                                                       |
| Invert V             | v_invert         | off           | When enabled, the v coordinates are inverted on the vertical axis.                                                                                                                                                                                                                                                                                         |
| U Scale              | u_scale          | 1             | Stretches or squashes the texture on the horizontal axis.                                                                                                                                                                                                                                                                                                  |
| V Scale              | v_scale          | 1             | Stretches or squashes the texture on the vertical axis.                                                                                                                                                                                                                                                                                                    |
| Attribute Name       | uv_attrib_name   | primvars:st   | Specifies the name of the attribute to use for the UV coordinates of the upstream geometry. If your geometry has more than one set of UV coordinates, you can choose the attribute that suits the projection type.                                                                                                                                         |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                            |
|----------------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Generate Perspective | generate_w           | off           | When enabled, GeoUVProject generates an <b>stw</b> attribute that adds a perspective component <b>w</b> to the UV coordinates.                                                                                                                                                                      |
| W Attribute Name     | uvw_attrib_name      | primvars:stw  | When <b>Generate Perspective</b> is enabled, <b>W Attribute Name</b> specifies the name of the attribute to use for the perspective UV coordinates of the upstream geometry. If your geometry has more than one set of UV coordinates, you can choose the attribute that suits the projection type. |
| Reference Frame      |                      |               |                                                                                                                                                                                                                                                                                                     |
| Use Reference Frame  | use_reference_frame  |               | If on the projection will be applied at the reference frame only.                                                                                                                                                                                                                                   |
| Reference Frame      | reference_frame      |               | The reference frame for the projection. The projection is performed at this frame and the UVs will be used for all other frames. This allows a projection to be stuck to a changing geometry.                                                                                                       |
| Animation Menu       | animation_menu       |               | Allows you to view animation keys and modify them.                                                                                                                                                                                                                                                  |
| Set to Current Frame | set_to_current_frame |               | Set the reference frame to the current frame.                                                                                                                                                                                                                                                       |

# GeoViewScene

The GeoViewScene node displays the USD stage passing through the node in read-only text form. GeoViewScene is primarily used for debugging layers imported from other applications, such as Houdini or Maya. If something doesn't look right in the Viewer, you can compare the source code between apps to check there were no errors during import.



**Tip:** If you want to add a USD layer manually use the [GeoScript](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                          |
|-----------------|-----------------|---------------------------------------------------|
| Input           | unnamed         | The previous stage in the scene you want to view. |

| Control (UI)   | Knob (Scripting) | Default Value      | Function                                                        |
|----------------|------------------|--------------------|-----------------------------------------------------------------|
| GeoViewScene   |                  |                    |                                                                 |
| Refresh        | refresh          | N/A                | Click to refresh the source panel if the stage has changed.     |
| Maximum Length | max_length       | 500                | Sets the maximum number of lines displayed in the source panel. |
| Source         | usd_source       | dependent on stage | Displays the USD stage in text form.                            |

# MergeLayer

The MergeLayer node combines two input shaders to produce a composite of the two. The default merge operation is A **over** B, but several other **Operations** are available, such as **stencil** and **mask**.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                           |
|-----------------|-----------------|------------------------------------------------------------------------------------|
| Input           | A               | The two shaders you want to merge. The default merge operation is A <b>over</b> B. |
|                 | B               |                                                                                    |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MergeLayer Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Channels       | channels         | rgba          | <p>The shader merge is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Also Merge     | also_merge       | none          | Sets the shader channels that are merged in addition to those specified in the <b>channels</b> control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Operation      | operation        | over          | <p>Sets the merge operation to use:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - No merge is calculated, only shader <b>B</b> affects the output.</li> <li>• <b>replace</b> - Replaces shader <b>B</b> with shader <b>A</b>.</li> <li>• <b>over</b> - This is the default operation. Layers shader <b>A</b> over <b>B</b> according to the alpha of shader <b>A</b>. Algorithm: <b>A+B(1-a)</b></li> <li>• <b>stencil</b> - Only shows the areas of shader <b>B</b> that do not overlap with the alpha of <b>A</b>. Algorithm: <b>B(1-a)</b></li> <li>• <b>mask</b> - Only shows the areas of shader <b>B</b> that overlap with the alpha of <b>A</b>. Algorithm: <b>Ba</b></li> <li>• <b>plus</b> - The sum of image <b>A</b> and <b>B</b>. Note that <b>plus</b> may result in pixel values higher than 1.0. Algorithm: <b>A+B</b></li> <li>• <b>max</b> - Takes the maximum values of both shaders. Algorithm: <b>max(A,B)</b></li> <li>• <b>min</b> - Takes the minimum values of both images. Algorithm: <b>min(A,B)</b></li> </ul> |

# PointLight

A PointLight is a point in 3D space that emits light radially in every direction. Real world examples of point lights are light bulbs, lamps, and candles, which can be simulated using PointLights.

See also [DirectLight](#), [EnvironmentLight](#), and [SpotLight](#).



**Tip:** PointLight's classic 3D system equivalent is the [Point](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | look            | An optional input to force the light to "look" at an Axis node.                                                                                                                                                           |
|                 | axis            | An optional input to link the position, rotation, scale, and skew of the transformed 3D object(s) to an Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node. |



**Tip:** If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.

| Control (UI)             | Knob (Scripting)         | Default Value | Function                                                                                                                                             |
|--------------------------|--------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| PointLight Tab           |                          |               |                                                                                                                                                      |
| Radius                   | radius                   | 0.5           | Controls the size of the surface from which light is emitted, allowing you to simulate different light sources.                                      |
| Color                    | color                    | 1             | Sets the color of the light.                                                                                                                         |
| Intensity                | intensity                | 1             | Sets the brightness of the light as a direct source of light, such as a light bulb.                                                                  |
| Enable Color Temperature | enable_color_temperature | off           | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Color Temperature        | color_temperature        | 1             | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Exposure                 | exposure                 | 0             | Sets the brightness of the light as an indirect or ambient source of light, such as light reflected from the environment where the light is located. |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normalize                                                                           | normalize        | off           | Unsupported in the current USD library version used in Nuke.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Diffuse                                                                             | diffuse          | 1             | Sets the amount of diffuse reflection created by the light, such as light bouncing off soft furnishings and clothing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Specular                                                                            | specular         | 1             | Sets the amount of specular reflection created by the light, such as light bouncing off metal and other highly reflective surfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Display                                                                             | display          | wireframe     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| Selectable                                                                          | selectable       | on            | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                  |
| Rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                   |
| Scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                    |
| Uniform Scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                     |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                     |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       | You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                                                                                                        |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Specify Matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                           |
| Matrix          | matrix           | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for                                                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | example, if you wanted to align objects in a scene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| World Matrix |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| World matrix | world_matrix     | N/A           | Displays the world or absolute xyz transform of the node in world coordinates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|              |                  |               | <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Shadows Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| cast shadows | cast_shadows     | disabled      | When enabled, the light casts shadow as defined by the <b>Shadow</b> controls. However, casting shadows from a Point light type is not currently supported in the ScanlineRender node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| shadow mode  | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender.</li> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter       | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)  | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scene epsilon | scene_epsilon       | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                      |
| samples       | samples             | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                              |
| sample width  | sample_width        | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is only relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                  |
| bias          | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| slope bias    | depthmap_slope_bias | 0.01          | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the</p>                                                                                                                                                                                     |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                     |               | <p>light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                     |
| clipping threshold  | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered transparent if their alpha is below the value set here.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                  |
| jitter scale        | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| depthmap resolution | depthmap_width      | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p>                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b> . |
| output mask  | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                |
|              |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled.                           |

# PointsGenerator

Using the PointsGenerator node (NukeX only) you can create a dense point cloud based on the information generated by [CameraTracker](#) and use the dense point cloud further to create 3D meshes of your 2D footage. Dense point clouds are a useful starting point for 3D modeling and positioning objects in a scene.



**Note:** The analysis must be performed in NukeX, but the result can be used in Nuke.



**Tip:** PointsGenerator's classic 3D system equivalent is the [PointCloudGenerator](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------|
| Input           | Camera          | The camera track of the scene from which you intend to generate the dense point cloud. |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Mask            | <p>An optional image to use as a mask. By default, the point cloud is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>Mask</b> control is disabled or set to <b>None</b>.</p> |
|                 | Source          | The source footage from which the camera information was obtained.                                                                                                                                                                                                                                                                                                           |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PointsGenerator Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Path                | prim_path        | none          | The root path of the new object. <b>Path</b> defaults a prim path variable <b>{parent}/{nodename}</b> which is equal to the node name, such as PointsGenerator1 or PointsGenerator5.                                                                                                                                                                                                                                                                                                                                                  |
| Parent Type         | parent_prim_type | Xform         | <p>Sets the type of prim to create if there are missing ancestors in the path.</p> <div>  <b>Note:</b> Setting the <b>Parent Type</b> to <b>None</b> may cause some referenced objects to behave as if they don't exist. </div>                                                                                                                                                                                                                    |
| Ignore Mask         | ignore           | None          | <p>Set the mask type to exclude areas of the sequence during generation:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the <b>Mask</b> input to define which areas to ignore.</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the <b>Mask</b> input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted <b>Mask</b> input alpha channel to define which areas to ignore.</li> </ul> |
| Set Keyframes    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                             |
| Analyze Sequence | analyzeSequence  | N/A           | <p>Click to automatically analyze the sequence and set the required keyframes to use when generating the point cloud.</p> <div>  <b>Note:</b> Keyframes are selected to provide a large enough camera baseline to triangulate points, but you can add and delete keyframes manually, if necessary. </div>                  |
| Keyframes        | keyframes        | 0             | Displays the frames used to track points in the input sequence. Both automatic and manual keyframes are shown.                                                                                                                                                                                                                                                                                              |
| Add              | addKeyframe      | N/A           | Click to set a keyframe at the current frame.                                                                                                                                                                                                                                                                                                                                                               |
| Delete           | deleteKeyframe   | N/A           | Click to delete the keyframe at the current frame.                                                                                                                                                                                                                                                                                                                                                          |
| Frame Spacing    | frameSpacing     | 15            | Sets the interval between keyframes when you click <b>Add All</b> . For example, the default value creates a keyframe every 15th frame.                                                                                                                                                                                                                                                                     |
| Add All          | addAllKeyframes  | N/A           | Click to set keyframes throughout the sequence at intervals specified by the <b>Frame Spacing</b> control. For example, for a sequence with 30 frames, the default spacing value creates 3 keyframes.                                                                                                                                                                                                       |
| Delete All       | deleteKeyframes  | N/A           | Click to delete all keyframes in the sequence.                                                                                                                                                                                                                                                                                                                                                              |
| Calculated       | accuracy         | 0             | Displays the depth accuracy calculated at the current                                                                                                                                                                                                                                                                                                                                                       |



| Control (UI)            | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|-----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accuracy                |                       |               | <p>frame when using the automatic <b>Set Keyframes</b> method.</p> <p>The accuracy rating can help you to select frame ranges when generating a point cloud - higher accuracy frames produce cleaner point clouds.</p>                                                                                                                                                    |
| Dense Tracking          |                       |               |                                                                                                                                                                                                                                                                                                                                                                           |
| Point Separation        | pointSeparation       | 2             | Sets the separation value, in pixels, for points in the dense point cloud. Reduce the separation to create denser point clouds and vice-versa.                                                                                                                                                                                                                            |
| Track Threshold         | matchThreshold        | 0.5           | Sets the correlation threshold at which point tracks are terminated. Use a higher threshold to increase the accuracy in matching points between keyframes.                                                                                                                                                                                                                |
| Track Points            | track                 | N/A           | <p>Click to display a frame range dialog to determine which frames are used to calculate the point cloud. Use the standard Nuke notation, for example, 1-19, 40-60, 65-100.</p> <p>Points can also be added to the point cloud in stages using different frame range selections. Use <b>Calculated Accuracy</b> to determine the most accurate frames for generation.</p> |
| Clear Points            | clearPoints           | N/A           | Click to clear all tracked points.                                                                                                                                                                                                                                                                                                                                        |
| Post Filtering          |                       |               |                                                                                                                                                                                                                                                                                                                                                                           |
| Display rejected points | displayRejectedPoints | enabled       | <p>When enabled, points that fall outside the <b>Angle</b> and <b>Density Thresholds</b> are highlighted in the 3D Viewer.</p> <p>When disabled, all rejected points are removed from the Viewer.</p>                                                                                                                                                                     |
| Angle Threshold         | minTriAngle           | 1             | Sets the threshold for the minimum angle to triangulate 3D points (in degrees). Points with a large triangulation angle are more accurate. Set a threshold of 0 to triangulate all points. Increase the threshold to                                                                                                                                                      |

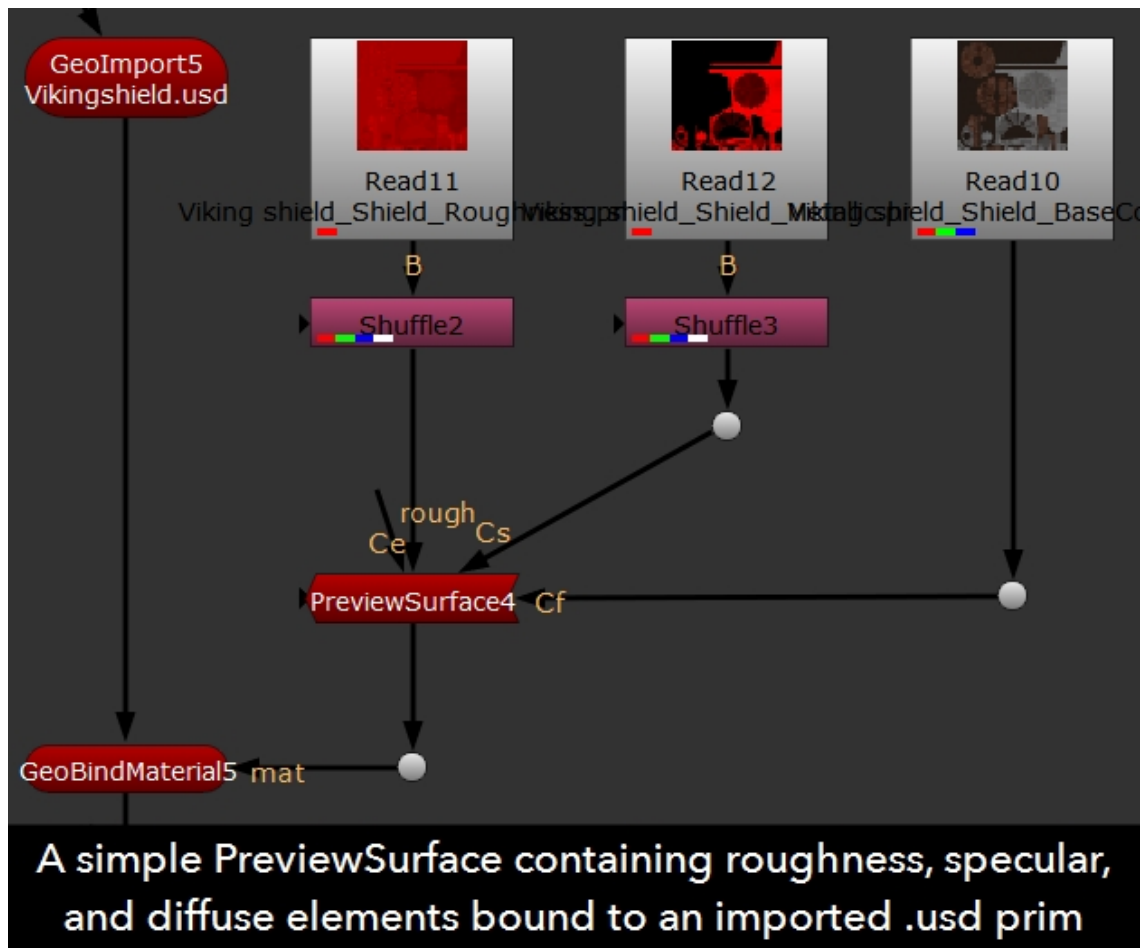
| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                  |               | retain the more accurate points.<br><br>As a rule of thumb, anything below 5 degrees is likely to be incorrect.                                                                                                                                                                                                                                                                                                                      |
| Density Threshold          | densityThreshold | 0             | Sets the threshold for the minimum density for points. Set a threshold of 0 to output all points and increase the threshold to highlight isolated points.                                                                                                                                                                                                                                                                            |
| Delete Rejected Points     | deleteRejected   | N/A           | Click to permanently delete points that are rejected by the <b>Angle</b> and <b>DensityThresholds</b> .<br><br><div>  <b>Tip:</b> To clean up the point cloud, try enabling <b>Output points per frame</b> and <b>Display rejected points</b>. You can then tune the <b>Post Filtering</b> thresholds and delete points at different frames. </div> |
| Output                     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Point Size                 | pointSize        | 2             | Sets the size, in pixels, of points displayed in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                      |
| Output points per frame    | outputPerFrame   | off           | When enabled, only the points generated at the current frame are displayed in the Viewer.<br><br>When disabled, points from all tracked frames are displayed.                                                                                                                                                                                                                                                                        |
| Groups Tab                 |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Display groups in overlay  | displayGroups    | on            | When enabled, group colors are displayed as an overlay in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                             |
| Output visible groups only | outputGroups     | off           | When enabled, only points designated as part of a group on the <b>Groups</b> tab are displayed in the 3D Viewer.<br><br>You can label the point cloud using <b>Groups</b> to help                                                                                                                                                                                                                                                    |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | visualize different parts of the scene.                                                                                                                                                                                                                                                                                                                                                            |
| Create Group                 | createGroup      | N/A           | Click to add the current vertex selections to a new group. You can also use the Viewer right-click menu to create, delete, and modify groups.                                                                                                                                                                                                                                                      |
| Delete Selected Group        | deleteGroup      | N/A           | Click to delete all selected groups and deselect the group in the point cloud.<br><br>To delete points use <b>Vertex selection</b> mode in the 3D Viewer and press the <b>delete</b> key.                                                                                                                                                                                                          |
| Groups                       | groups           | none          | Lists all groups in the point cloud and allows you to set the <b>name</b> , <b>color</b> , and <b>visibility</b> of each group.<br><br>To create groups, enable <b>Vertex selection</b> mode in the 3D Viewer. You can then select points and use the right-click menu to create a new group or add the selected points to an existing group.                                                      |
| Bake Selected Groups         | bakeGroups       | N/A           | Click to bake the selected groups to a separate, baked point cloud.                                                                                                                                                                                                                                                                                                                                |
| Bake Selected Groups to Mesh | bakeMesh         | N/A           | Click to convert the selected groups to a mesh using Poisson Surface Reconstruction.<br><br>Mesh creation is based on the SGP 2006 paper, Poisson Surface Reconstruction by Michael Kazhdan, Matthew Bolitho, and Hugues Hoppe. The original source code and paper can be found at <a href="http://www.cs.jhu.edu/~misha/Code/PoissonRecon/">http://www.cs.jhu.edu/~misha/Code/PoissonRecon/</a> . |
| Samples                      | samplesPerNode   | 1             | Specifies the minimum number of sample points used to calculate mesh points, using floating point values.<br><br>For noise-free point clouds, lower values in the range 1.0 - 5.0 can be used. For more noisy samples, higher values in the range 15.0 - 20.0 may provide a smoother mesh.                                                                                                         |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                      |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                         |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# PreviewSurface

The PreviewSurface node represents the preview shader from the Universal Scene Description standard. It is a basic material that can be used as a standard solution when switching between pipelines and different applications. For example, a game pipeline may rely on metallic workflows and film on specular workflows. PreviewSurface supports either by enabling or disabling the **Use Specular Workflow** control.



## Inputs and Controls

| Connection Type | Connection Name | Function                                                         |
|-----------------|-----------------|------------------------------------------------------------------|
| Input           | opa             | A hidden input that controls opacity in the shader preview.      |
|                 | N               | A hidden input that controls normals in the shader preview.      |
|                 | ao              | A hidden input that controls AOVs in the shader preview.         |
|                 | disp            | A hidden input that controls displacement in the shader preview. |
|                 | rough           | Controls roughness in the shader preview.                        |
|                 | Ce              | Controls emissive color in the shader preview.                   |
|                 | Cs              | Controls specular color in the shader preview.                   |
|                 | Cf              | Controls diffuse color in the shader preview.                    |

| Control (UI)          | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PreviewSurface        |                     |               |                                                                                                                                                                                                                                                                                                                                                                           |
| Diffuse Color         | diffuseColor        | 0.18          | Controls the amount of diffuse color applied in the shader from the <b>Cf</b> input.                                                                                                                                                                                                                                                                                      |
| Emissive Color        | emissiveColor       | 0             | Controls the amount of emissive color applied in the shader from the <b>Ce</b> input.                                                                                                                                                                                                                                                                                     |
| Use Specular Workflow | useSpecularWorkflow | off           | <p>When enabled, PreviewSurface uses the specular workflow preferred by film pipelines. The <b>Specular Color</b> slider controls the amount of specularity applied in the shader.</p> <p>When disabled, PreviewSurface uses the metallic workflow preferred by games pipelines. The <b>Metallic</b> slider controls the amount of metallicity applied in the shader.</p> |
| Specular Color        | specularColor       | 0             | Controls the amount of specularity applied in the shader from the <b>Cs</b> input. This control is                                                                                                                                                                                                                                                                        |

| Control (UI)         | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                               |
|----------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                     |               | only available when <b>Use Specular Workflow</b> is enabled.                                                                                                                                                           |
| Metallic             | metallic            | 0             | Controls the amount of metallicity applied in the shader from the <b>Cs</b> input. This control is only available when <b>Use Specular Workflow</b> is disabled.                                                       |
| Roughness            | roughness           | 0.5           | Controls the amount of roughness applied in the shader from the <b>rough</b> input.                                                                                                                                    |
| Roughness Channel    | roughnessChannel    | rgba.red      | Sets the channel from which roughness information is taken.                                                                                                                                                            |
| Opacity              | opacity             | 1             | Controls the amount of opacity applied in the shader from the <b>opa</b> input.                                                                                                                                        |
| Opacity Channel      | opacityChannel      | rgba.alpha    | Sets the channel from which opacity information is taken.                                                                                                                                                              |
| Opacity Threshold    | opacityThreshold    | 0             | Sets the threshold below which the <b>Opacity</b> value is ignored. <b>Opacity</b> values less than the threshold are not rendered and <b>Opacity</b> values greater than or equal to the threshold are fully visible. |
| Refraction           | ior                 | 1.5           | Sets index of refraction to be used for translucent objects and objects with specular components. This includes clearcoat if the <b>Clearcoat</b> value is greater than 0.                                             |
| Clearcoat            | clearcoat           | 0             | Sets a secondary specular amount of white applied in the shader.                                                                                                                                                       |
| Clearcoat Roughness  | clearcoatRoughness  | 0.01          | Sets the amount of roughness applied to the <b>Clearcoat</b> value in the shader.                                                                                                                                      |
| Displacement         | displacement        | 0             | Controls the amount of displacement in the direction of the normal that is applied in the shader from the <b>disp</b> input.                                                                                           |
| Displacement Channel | displacementChannel | rgba.red      | Sets the channel from which displacement information is taken.                                                                                                                                                         |

# Project3DShader

The Project3DShader node projects an input image through a camera that you can bind to a prim using the GeoBindMaterial node or the **img** input, if the prim has one..



**Tip:** Project3DShader's classic 3D system equivalent is the [Project3D](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                               |
|-----------------|-----------------|--------------------------------------------------------|
| Input           | cam             | The Camera node controlling the projection attributes. |
|                 | unnamed         | The 2D image of the material you want to project.      |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                   |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project3DShader |                  |               |                                                                                                                                                                                                                                                                                                                                            |
| project on      | project_on       | both          | Controls whether the image is projected on the <b>front</b> facing, <b>back</b> facing, or <b>both</b> polygons.                                                                                                                                                                                                                           |
| crop            | crop             | on            | When enabled, the input image is cropped at the edge of the camera frustum.<br><br>When disabled, the last pixels of the 2D material within the camera frustum are extended to cover the prim.                                                                                                                                             |
| occlusion mode  | occlusion_mode   | none          | Sets the ray casting projection occlusion test mode: <ul style="list-style-type: none"> <li>• <b>none</b> - occlusion testing is disabled.</li> <li>• <b>self</b> - only the geometry to which this shader is bound can occlude the projection.</li> <li>• <b>world</b> - any geometry in the scene can occlude the projection.</li> </ul> |



# ScanlineRender2

When connected to a [GeoScene](#) or [GeoMerge](#) node, the ScanlineRender node renders all the objects and lights connected to that scene from the perspective of the [Camera](#) connected to the **cam** input (or a default camera if no **cam** input exists). The rendered 2D image is then passed along to the next node in the Node Graph, and you can use the result as an input to other nodes in the script.

The ScanlineRender node can also output deep data if there is Deep data available from the scene graph.

See also [GeoScene](#), [GeoMerge](#), and [Camera](#).



**Tip:** ScanlineRender2's classic 3D system equivalent is the [ScanlineRender](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | cam             | An optional camera input. The scene is rendered from the perspective of this camera. If the camera input is not connected, ScanlineRender uses a default camera positioned at the origin and facing in the negative Z direction.                                                                                                                                                       |
|                 | obj/scn         | Either: <ul style="list-style-type: none"> <li>• A GeoScene or GeoMerge node that is connected to the objects and lights you want to render, or</li> <li>• a 3D object or prim.</li> </ul>                                                                                                                                                                                             |
|                 | bg              | An optional background input. This can be used to composite a background image into the scene and to determine the output resolution. If not used, this defaults to <b>root.format</b> or <b>root.proxy_format</b> defined in the <b>ProjectSettings</b> .<br><br>If this input contains a depth channel, ScanlineRender considers it when doing Z-buffer and Z-blending calculations. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ScanlineRender Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Objects Mask       | objects_mask     | //*           | <p>Specifies the mask pattern to match prim names to include in the output scene, excluding light prims such as <b>DirectLight1</b>.</p> <p>The default mask, <b>//*</b>, includes everything from the root of the scene graph. As you can see, you can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/GeoCube1 /GeoCard3</b> includes only those prims in the output scene.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div>              |
| Light Mask         | lights_mask      | //*           | <p>Specifies the mask pattern to match light names to include in the output scene, excluding object prims such as <b>GeoCube1</b>.</p> <p>The default mask, <b>//*</b>, includes everything from the root of the scene graph. As you can see, you can use standard glob-style variables, such as <b>/*</b>, to create masks or use individual prim names separated by spaces. For example, <b>/DirectLight1 /PointLight4</b> includes only those light prims in the output scene.</p> <div>  <b>Tip:</b> You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks. </div> |
| transparency       | transparency     | on            | When enabled, objects appear transparent where their alphas are less than 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Z-buffer     | ztest_enabled    | on            | Enable or disable the Z-buffer which compares object Z-depth within a scene, assisting with occlusions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Filter       | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| Antialiasing | antialiasing     | none          | Sets the level of antialiasing to reduce any aliasing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | artifacts in the render. Choose from <b>none</b> , <b>low</b> , <b>medium</b> and <b>high</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Z-blend mode     | zblend_mode      | none          | Type of ramp to use to blend two surfaces within the <b>Z-blend range</b> of each other. Smooth looks better, but linear is provided for back-compatibility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Z-blend range    | zblend_range     | 0.1           | Any two surfaces closer together than this distance on the Z axis are blended together to smooth the transition between intersecting objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Projection Mode  | projection_mode  | render camera | <p>The projection modes are:</p> <ul style="list-style-type: none"> <li>• <b>perspective</b> - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera.</li> <li>• <b>orthographic</b> - use orthographic projection (projection onto the projection plane using parallel rays).</li> <li>• <b>uv</b> - have every object render its UV space into the output format. You can use this option to cook out texture maps.</li> <li>• <b>spherical</b> - have the entire 360-degree world rendered as a spherical map. You can increase <b>tessellation max</b> to increase the accuracy of object edges as they are warped out of line, but this takes longer to render.</li> <li>• <b>render camera</b> - use the projection type of the render camera.</li> </ul> |
| Tessellation Max | max_tessellation | 3             | <p>Limits recursive subdivision of polygons by a screen-space distance percentage.</p> <p>This control can be useful in the <b>spherical</b> projection mode, which sometimes distorts object edges. If you see such distortions, you can try increasing this value to tessellate (subdivide) polygons into smaller polygons. This produces</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                      |               | more accurate object edges, but also takes longer to render.                                                                                                                                                                                                                                                                                                                                                              |
| Overscan        | overscan             | 0             | The maximum additional pixels to render beyond the left/right and top/bottom of the frame. Rendering pixels beyond the edges of the frame can be useful if subsequent nodes need to have access outside the frame. For example, a Blur node down the node tree may produce better results around the edges of the frame if overscan is used. Similarly, a subsequent LensDistortion node may require the use of overscan. |
| Lighting        | lighting_enable_mode | auto          | Controls whether or not lights in the scene affect the 2D output. Selecting <b>off</b> ignores the effect of any lights in the scene in the 2D Viewer, but you can still see the light's effect in the 3D Viewer.                                                                                                                                                                                                         |
| Ambient         | ambient              | 0             | Enter a value between 0 (black) and 1 (white) to change the global ambient color.                                                                                                                                                                                                                                                                                                                                         |
| MultiSample Tab |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Samples         | samples              | 1             | Sets the number of samples to render per pixel, to produce motion blur and antialiasing. If you use this, in most cases you can turn off the antialiasing and filter controls on the <b>ScanlineRender</b> tab.                                                                                                                                                                                                           |
| Shutter         | shutter              | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame.                                                                                                                                                                                                                                                                                          |
| Shutter Offset  | shutteroffset        | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to</li> </ul>                                                                                                                                           |



| Control (UI)    | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                     |               | <p>1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</p> <ul style="list-style-type: none"> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
|                 | shuttercustomoffset | 0             | <p>If the <b>shutter offset</b> parameter is set to <b>custom</b>, this parameter is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Randomize Time  | temporal_jitter     | 0             | <p>Adds randomness to the distribution of samples in time so they don't produce regularly spaced images. The larger the value, the larger the time difference between the samples.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Sample Diameter | spacial_jitter      | 1             | <p>The diameter of the circle that the samples for each pixel are placed in for antialiasing. The larger the value, the more pixels are jittered.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Focus Diameter  | focal_jitter        | 0             | <p>Randomly orbit the camera about a point at the <b>focal distance</b> in front of it for each sample to produce depth-of-field effects from multiple samples.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                      |               |  <b>Note:</b> The <b>focal distance</b> is set in the Camera node's controls, in the <b>Projection</b> tab.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Stochastic Samples   | stochastic_samples   | 0             | <p>Sets the number of samples, per pixel, to use in stochastic estimation (zero is disabled). Lower values result in faster renders, while higher values improve the quality of the final image.</p> <p>Stochastic sampling is based on Robert L. Cook's <i>Stochastic Sampling in Computer Graphics</i>, available in <i>ACM Transactions on Graphics</i>, Volume 6, Number 1, January 1996.</p>  <b>Note:</b> It is recommended for motion blur that the <b>samples</b> control is adjusted. This also provides anti-aliasing by jittering the sample point. |
| Uniform Distribution | uniform_distribution | off           | When enabled, use a uniform temporal distribution of scenes to sample. This generates more accurate results for stochastic multisampling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Shader Tab           |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Motion Vectors       | motion_vectors_type  | distance      | <p>Select how to render motion vectors:</p> <ul style="list-style-type: none"> <li>• <b>off</b> - do not render motion vectors.</li> <li>• <b>classic</b> - render motion vectors the classic (pre-Nuke 6.1) way. This option is only provided for backwards compatibility, and isn't always accurate.</li> <li>• <b>velocity</b> - store the velocity of every single pixel in the motion vector channels (pre-Nuke 7.0 way). This option is only provided for backwards compatibility. In order to have the same behavior as Nuke 6.3, set <b>samples</b> to 1.</li> </ul>                                                                    |

| Control (UI)            | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|-------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                         |               | <ul style="list-style-type: none"> <li>• <b>distance</b> - for every pixel, store the distance (in pixels) between samples in the motion vector channels. This is the recommended option that usually produces the best results. It also allows the <a href="#">VectorBlur</a> node to produce curved vector blur where interpolation between two frames is made according to a curve rather than linearly.</li> </ul> |
| Motion Vector Channels  | MB_channel              | forward       | <p>The channels the motion vectors are output to.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                    |
| Output Vectors          | output_shader_vectors   | off           | When enabled, shader vectors ( <b>surface points</b> and <b>surface normals</b> ) are output as well as motion vectors. These can be useful if you want to relight the rendered 3D scene in the compositing phase.                                                                                                                                                                                                     |
| Surface Point           | P_channel               | none          | The channel to use as the surface point channel. When <b>output vectors</b> is enabled, ScanlineRender outputs the surface point positions (in world space coordinates) into this channel.                                                                                                                                                                                                                             |
| Surface Normal          | N_channel               | none          | The channel to use as the surface normal channel. When <b>output vectors</b> is enabled, ScanlineRender outputs the surface point normals (in world space coordinates) into this channel.                                                                                                                                                                                                                              |
| Deep Tab                |                         |               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Drop Zero Alpha Samples | drop_zero_alpha_samples | enabled       | <p>When enabled, deep samples with an alpha value of 0 do not contribute to the output.</p> <p>When disabled, deep samples with an alpha value 0 contribute to the output.</p>                                                                                                                                                                                                                                         |



# SpotLight

SpotLight nodes create a point in 3D space that emits a cone-shaped light in a given direction. A real world example of a spot light is a desk lamp.

See also [DirectLight](#), [EnvironmentLight](#), and [PointLight](#).



**Tip:** SpotLight's classic 3D system equivalent is the [Spot](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                  |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | look            | An optional input to force the light to "look" at an Axis node.                                                                                                                                                           |
|                 | axis            | An optional input to link the position, rotation, scale, and skew of the transformed 3D object(s) to an Axis node, so that the transformation controls on the Axis node override the corresponding controls on this node. |



**Tip:** If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                      |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| SpotLight Tab |                  |               |                                                                                                               |
| Cone Angle    | cone_angle       | 0             | Sets the spot light cone angle, which adjusts the spread of the light. Valid angles are from 0 to 90 degrees. |
| Cone Softness | cone_softness    | 0             | Unsupported in the current USD library version used                                                           |

| Control (UI)             | Knob (Scripting)         | Default Value | Function                                                                                                                                             |
|--------------------------|--------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                          |               | in Nuke.                                                                                                                                             |
| Focus                    | focus                    | 0             | Sets the brightness of the light as a direct source of light, such as a desk lamp.                                                                   |
| Focus Tint               | focus_tint               | 1             | Unsupported in the current USD library version used in Nuke.                                                                                         |
| IES Angle Scale          | ies_angle_scale          | 0             | Unsupported in the current USD library version used in Nuke.                                                                                         |
| IES File                 | ies_file                 | none          | Unsupported in the current USD library version used in Nuke.                                                                                         |
| IES Normalize            | ies_normalize            | off           | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Color                    | color                    | 1             | Sets the color of the light.                                                                                                                         |
| Intensity                | intensity                | 1             | Sets the brightness of the light.                                                                                                                    |
| Enable Color Temperature | enable_color_temperature | off           | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Color Temperature        | color_temperature        | 1             | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Exposure                 | exposure                 | 0             | Sets the brightness of the light as an indirect or ambient source of light, such as light reflected from the environment where the light is located. |
| Normalize                | normalize                | off           | Unsupported in the current USD library version used in Nuke.                                                                                         |
| Diffuse                  | diffuse                  | 1             | Sets the amount of diffuse reflection created by the light, such as light bouncing off soft furnishings and clothing.                                |
| Specular                 | specular                 | 1             | Sets the amount of specular reflection created by the light, such as light bouncing off metal and other highly reflective surfaces.                  |
| Display                  | display                  | wireframe     | Adjust the display characteristics of the 3D object. These                                                                                           |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <p>settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| Selectable                                                                          | selectable       | on            | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                          |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <p>Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>Geo to Selection (position)</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation)</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Geo to Selection (position, orientation, size)</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position)</b> - the pivot point is snapped to a new position depending on the points selected.</li> <li>• <b>Pivot Point to Selection (position, orientation)</b> - the pivot point is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Pivot Point to Selection (orientation)</b> - the pivot point is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| Transform Order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rotation Order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Uniform Scale                                                                     | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Pivot Translate | pivot_translate  | 0, 0, 0       | When you make changes to a 3D object’s position, scaling, skewing, and rotation, these occur from the location of the object’s origin point or pivot. The pivot translate and rotate x, y, and z controls allow you to move and rotate the pivot point as required - you can even move it outside of the object. Subsequent transformations applied then occur relative to the new pivot point location and rotation.<br><br>You can hold down <b>Ctrl/Cmd</b> and drag the pivot point to a new location in the 3D Viewer. |
| Pivot Rotate    | pivot_rotate     | 0, 0, 0       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Specify Matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you’re transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                 |
| matrix          | matrix           | N/A           | The matrix displays values from the object’s transform, rotate, scale, skew, and pivot controls.<br><br>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                                                                                                                              |
| World Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| matrix        | matrix           | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Shadows Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| cast shadows  | cast_shadows     | disabled      | When enabled, the light casts shadow as defined by the <b>Shadow</b> controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| shadow mode   | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender.</li> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| scene epsilon | scene_epsilon    | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|---------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| samples      | samples             | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This only applies when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                           |
| sample width | sample_width        | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is <b>only</b> relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                                                                                                                                                                                            |
| bias         | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This only applies when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                              |
| slope bias   | depthmap_slope_bias | 0.001         | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or</p> |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                     |               | <b>clipped alpha.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| clipping threshold  | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered solid if their alpha is below the value set here.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                    |
| jitter scale        | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| depthmap resolution | depthmap_width      | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                    |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| output mask  | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .      |
|              |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled. |

# WireFrameShader

The WireFrameShader node is used to apply a wireframe material to a prim.



**Tip:** WireFrameShader's classic 3D system equivalent is the [Wireframe](#) node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | unnamed         | The 2D image you're using for the surface texture. |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WireFrameShader Tab |                  |               |                                                                                                                                                                                                         |
| Channels            | channels         | rgba          | <p>The material is only applied to these channels.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation    | operation        | opaque        | <p>Sets the wireframe render mode:</p> <ul style="list-style-type: none"> <li>• <b>opaque</b> - displays the wireframe over a solid black geometry.</li> <li>• <b>see through</b> - displays the wireframe over a fully transparent geometry so you can see the wires on all surfaces.</li> <li>• <b>over</b> - displays the wireframe over the input shader.</li> <li>• <b>multiply</b> - displays the wireframe multiplied by the input shader over a fully transparent geometry.</li> <li>• <b>modulate</b> - modulates the wireframe color by a standard diffuse contribution and displays over the input shader. This mode is affected by any lights in the scene.</li> </ul> |
| Line Width   | line-width       | 0.5           | Sets the width of the wireframe lines.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Line Color   | line_color       | 1             | Sets the color of the wireframe lines, multiplied by the alpha channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

# Classic 3D Nodes

Nuke's classic 3D nodes, superseded by the new USD-based nodes, deal with Nuke's 3D workspace, which allows you to set up a 3D composite for camera moves, set replacement, and other applications where you need to simulate a "real" dimensional environment.

## AmbientOcclusion

This shader node calculates ambient occlusion for 3D scenes rendered into 2D using the RayRender node. AmbientOcclusion is not supported by ScanlineRender or PrmanRender.

See also [RayRender](#).

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                           |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | Either: <ul style="list-style-type: none"><li>• The 2D image you're using for the surface texture, or</li><li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li></ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                              |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| samples      | samples          | 10            | Controls the number of rays used to detect if an object is occluded. Increasing the number of samples reduces noise and produces a better quality result, but increases render times. |
| spread       | spread           | 1             | Controls the angular spread around the normal in the range 0-1, where 1 is equal to 90° (the full hemisphere).                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| falloff      | falloff          | 0             | Sets the exponential falloff rate for the occlusion along the ray distance.                                   |
| near clip    | near             | 0             | Controls the minimum (near) and maximum (far) occlusion distances sampled when calculating ambient occlusion. |
| far clip     | far              | 10            |                                                                                                               |

# ApplyMaterial

Apply a material from the **mat** input to your 3D object(s). For example, you can use this node to apply a global material to several merged objects (note that this overrides any individual materials applied to the geometry before it was merged).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                            |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object to which you want to apply a material. If you want to apply the same material to several objects, you can also connect a MergeGeo node here. |
|                 | mat             | The material you want to apply to your 3D object, for example, a BasicMaterial node.                                                                                |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                               |
|-------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ApplyMaterial Tab |                  |               |                                                                                                                                                                        |
| display           | display          | unchanged     | Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. |



| Control (UI) | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                   |               | <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul>                         |
| selectable   | selectable        | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| render       | render_mode       | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| filter       | filter_type       | all           | <p>Select the geometry objects to which the material is applied:</p> <ul style="list-style-type: none"> <li>• <b>all</b> - apply the material to all incoming geometry objects.</li> <li>• <b>name</b> - only apply the material to incoming geometry objects that match the filter name settings.</li> </ul> <div>  <b>Note:</b> For <b>name</b> to work, the geometry has to have a name attribute. The only nodes that add this attribute are ModelBuilder and ReadGeo (when reading in an Alembic and USD files), but third-party plug-ins can add it too. </div> |
|              | filter_name_match | contains      | Sets how to filter the incoming geometry objects to determine which objects the material is applied to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>equals</b> - set the material on any objects whose name matches the string in the filter name field exactly.</li> <li>• <b>doesn't equal</b> - set the material on any objects whose name does not match the string in the filter name field exactly.</li> <li>• <b>contains</b> - set the material for any objects whose name contains the string in the filter name field.</li> </ul> <p>This can be useful when you have some structure to your object names. For example, if you have objects like /Root/Chair/Seat, /Root/Chair/Back, and /Root/Table, you can select <b>contains</b> and set the filter name field to <b>chair</b> to apply the material to all parts of the chair while leaving the table alone.</p> <ul style="list-style-type: none"> <li>• <b>doesn't contain</b> - set the material for any objects whose name does not contain the string in the filter name field.</li> </ul> <p>This control is only available when <b>filter</b> is set to <b>name</b>.</p> |
|              | filter name      | N/A           | <p>The filter name to use to determine which objects the material is applied to. You can type the filter name directly into this field or use the <b>choose</b> button to select a filter name from a list of incoming geometry objects.</p> <p>This control is only available when <b>filter</b> is set to <b>name</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| choose       | filter_refresh   | N/A           | <p>Open the <b>Object Name Chooser</b> dialog. This allows you to select a filter name from a list of incoming geometry objects.</p> <p>This control is only available when <b>filter</b> is set to <b>name</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

# Axis

Axis nodes act as null objects by adding a new transformational axis to which other objects may be parented. Even when objects already have their own internal axes, it's sometimes useful to parent in a separate axis. For example, when an Axis node is parented to other objects in a scene, the node globally controls the scene - rotating the axis rotates all objects in the scene.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | <p>An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on the TransformGeo node.</p> <p>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</p> |
|                 | look            | <p>An optional input where you can connect a Camera, Light, or another Axis that the Axis is automatically rotated to point toward. The Axis automatically rotated to point towards the connected input whenever the <b>look</b> input is moved.</p>                                                                                                                        |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Axis Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                             |
| read from file | read_from_file   | disabled      | <p>When disabled, the axis is configured using the controls on the <b>Axis</b> tab. Enable <b>read from file</b> if you want to read in axis information from an .fbx file using the <b>File</b> tab.</p> <div>  <b>Note:</b> This control is linked to the <b>read from file</b> control on the <b>File</b> tab. </div> |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| display                                                                             | display          | wireframe     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + lines</b> - displays the wireframe plus the surface texture.</li> </ul> <div>  <b>Note:</b> The Viewer node <b>3D &gt; display</b> setting overrides this control. </div> |
| selectable                                                                          | selectable       | enabled       | <p>When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the objects attached to the Axis node according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the Axis node as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                                                                                                               |



| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the objects attached to the Axis are snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the objects attached to the Axis are snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the objects attached to the Axis are snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the 3D objects attached to the Axis node along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                          |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the 3D objects attached to the Axis node around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                         |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the 3D objects attached to the Axis node on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the 3D objects attached to the Axis node simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the 3D objects attached to the Axis node on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| pivot                                                                             | pivot            | 0, 0, 0       | When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                   |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                       |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                             |
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                   |
| World matrix   | world_matrix     | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                            |
| File Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                   |
| read from file | read_from_file   | disabled      | <p>When disabled, the axis is configured using the controls on the <b>Axis</b> tab. Enable <b>read from file</b> if you want to read in axis information from an .fbx file.</p> <div>  <b>Note:</b> This control is linked to the <b>read from file</b> control on the <b>Axis</b> tab. </div>                                 |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| file                 | file             | N/A           | Sets the file path for the .fbx file from which you intend to import axis information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| reload               | reload           | N/A           | Click to reload the axis information from the specified file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| USD Options          | scene_graph      | N/A           | <p>When the <b>file</b> path is pointing to a valid <b>.usd</b> file, the <b>USD Options</b> are displayed.</p> <p>The <b>USD Options</b> show a scenegraph containing a list of the item names and their paths inside the <b>.usd</b> file.</p> <p>Click an item to select it and load it into the scene. The selected item can be identified in the <b>Load</b> column.</p> <p>Items in the <b>.usd</b> file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene.</p> <div>  <b>Note:</b> For more information about importing Axes from a <b>.usd</b> file, see <a href="#">Importing USD Items</a>. </div> |
| animation stack name | fbx_take_name    | N/A           | When the <b>file</b> control is pointing to a valid .fbx file, select the required <b>take name</b> from the dropdown menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| node name            | fbx_node_name    | N/A           | When the <b>file</b> control is pointing to a valid .fbx file, select the required <b>node name</b> from the dropdown menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| frame rate           | frame_rate       | 24            | When <b>use frame rate</b> is enabled, enter the required frame rate to use instead of the rate specified in the input file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| use frame rate       | use_frame_rate   | disabled      | When enabled, the frame rate from the input file is ignored and the specified <b>frame rate</b> is used instead.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Look Tab             |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| look axis            | look_axis        | -Z            | The axis around which the Axis is rotated to face the <b>look</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| rotate X             | look_rotate_x    | enabled       | Determines whether the rotation occurs around the X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                   |
|-----------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                      |               | axis. Note that for the rotation to truly "look at" the <b>look</b> input, all three of these options must be activated.                                                   |
| rotate Y        | look_rotate_y        | enabled       | Determines whether the rotation occurs around the Y axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options. |
| rotate Z        | look_rotate_z        | enabled       | Determines whether the rotation occurs around the Z axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options. |
| look strength   | look_strength        | 1             | Determines to what extent the Axis rotates to the new orientation. The smaller the value, the less the object is rotated. Setting the value to 0 produces no rotation.     |
| use quaternions | look_use_quaternions | disabled      | Uses an alternate scheme to calculate the <b>look</b> rotation. This option may be useful to smooth out erratic rotations along the look axis.                             |

# BasicMaterial

This node lets you control what material your objects seem to be made of. It combines the Diffuse, Specular, and Emission nodes, allowing you to control all three aspects of the material with a single node.



**Note:** To see the effect of your changes to an object's material properties, you need to have at least one light node in your Scene. You also need to enable transparency and lighting in the Viewer settings. Press **S** over the 3D Viewer, and check **transparency** and **headlamp** on the **3D** tab.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | mapSh           | An optional mask for varying the shininess value. Where the mask is black, the shininess is set to <b>min shininess</b> . Where the mask is white, the shininess is set to <b>max shininess</b> . Values in between (where the matte is gray) are attenuated accordingly.             |
|                 | mapS            | An optional mask for limiting the effect of the specular component. Any changes you make to <b>specular</b> are limited to the non-black areas of the mask.                                                                                                                           |
|                 | mapE            | An optional mask for limiting the effect of the emissive component. Any changes you make to <b>emission</b> are limited to the non-black areas of the mask.                                                                                                                           |
|                 | mapD            | An optional mask for limiting the effect of the diffuse component. Any changes you make to <b>diffuse</b> are limited to the non-black areas of the mask.                                                                                                                             |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                        |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BasicMaterial Tab |                  |               |                                                                                                                                                                                                 |
| channels          | channels         | rgb           | The effect is only applied to these channels.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the checkboxes on the right to select individual channels. |
| emission          | emission         | 0             | Sets the color of the light the material emits. Note that                                                                                                                                       |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | when you have an image connected to the unnamed input of the BasicMaterial node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the emission value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                           |
| diffuse       | diffuse          | 0.18          | Sets the color of the material when illuminated. Note that when you have an image connected to the unnamed input of the BasicMaterial node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the diffuse value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| specular      | specular         | 0.8           | Sets how bright the highlights on the material seem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| min shininess | min_shininess    | 10            | <p>Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> <p>If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.</p> |
| max shininess | max_shininess    | 10            | <p>Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p>                                                                                                                                                                           |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.                                                                                                                                                                                                                                                                                                                                                                                                    |
| shininess channel | shininess_channel | luminance     | <p>Selects which channel from the <b>mapSh</b> input is used to map the black and white values to the <b>minshininess</b> and <b>maxshininess</b> controls. Choose:</p> <ul style="list-style-type: none"> <li>• <b>red</b> - use the red channel for the mapping.</li> <li>• <b>green</b> - use the green channel.</li> <li>• <b>blue</b> - use the blue channel.</li> <li>• <b>alpha</b> - use the alpha channel.</li> <li>• <b>luminance</b> - use the luminance.</li> <li>• <b>average rgb</b> - use the average of the red, green, and blue channels.</li> </ul> |

# BlendMat

The BlendMat node sets how the pixels colored by the material it is applied to combine with the pixels from objects behind. It is like the MergeMat node, but instead of blending with another material, it blends with whatever is rendered behind in the 3D scene.



**Note:** Multiple BlendMat operations on the same layer may produce unexpected results.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                        |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 2D image you're using for the material to merge with the background pixels in the 3D scene. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BlendMat Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| channels     | channels         | rgba          | <p>The effect is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| operation    | operation        | over          | <p>Select how you want to composite the BlendMat node's input material and the background pixels together:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - set the material to black.</li> <li>• <b>replace</b> - show the material where the material and the background overlap.</li> <li>• <b>over</b> - composite the material over the background pixels according to the material's alpha.</li> <li>• <b>stencil</b> - show the background pixels where the material's alpha is black. Where the material's alpha is white, the material is set to black. For this to work, the BlendMat node needs to process the alpha channel, so set channels to rgba. This operation is the opposite of mask.</li> <li>• <b>mask</b> - show the background pixels where the material's alpha is white. Where the material's alpha is black, the material is also set to black. For this to work, the BlendMat node needs to process the alpha channel, so set channels to rgba. This operation is the opposite of stencil.</li> <li>• <b>plus</b> - add the background pixels to the material.</li> </ul> |



| Control (UI)  | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |                | <ul style="list-style-type: none"> <li>• <b>max</b> - use the material if its pixel values are greater than the background pixels or else use the background pixels.</li> <li>• <b>min</b> - use the material if its pixel values are less than the background pixels or else use the background pixels.</li> </ul>                                                                                                                                                                                               |
| surface blend | surfaceblend     | input fragment | <p>Determines how the input texture blends with the vertex color of the geometry to which the shader is applied:</p> <ul style="list-style-type: none"> <li>• <b>input texture</b> - only use the input texture.</li> <li>• <b>vertex color</b> - only use the vertex color.</li> <li>• <b>modulate</b> - texture * vertex color.</li> <li>• <b>plus</b> - texture + vertex color.</li> <li>• <b>over</b> - (texture + ((1 - a) * vertex color)).</li> <li>• <b>subtract</b> - texture - vertex color.</li> </ul> |

# Camera

Cameras may be connected to either the Scene node or the ScanlineRender node. Camera connected to a ScanlineRender node define the projection for use by the 3D renderer. You can connect additional cameras to the Scene node and switch between them by choosing the viewing camera from the dropdown menu at the top of the Viewer. You can also read in **.fbx**, **.abc**, and **.usd** scene files containing standard cameras, though only one camera per Camera node can be read.

Cameras can also be used to project 2D textures onto 3D objects in a scene using the controls on the **Projection** tab and a Project3D node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | <p>An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on the TransformGeo node.</p> <p>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</p> |
|                 | look            | <p>An optional input where you can connect a Camera, Light, or Axis that the Light is automatically rotated to point toward. The Light is automatically rotated to point towards the connected input whenever the <b>look</b> input is moved.</p>                                                                                                                           |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Camera Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| read from file | read_from_file   | disabled      | <p>When disabled, the camera is configured using the controls on the <b>Camera</b> tab. Enable <b>read from file</b> if you want to read in camera information from a file using the <b>File</b> tab.</p> <div>  <b>Note:</b> This control is linked to the <b>read from file</b> control on the <b>File</b> tab. </div>                                  |
| display        | display          | wireframe     | <p>Adjust the display characteristics of the camera. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - doesn't display the camera geometry.</li> <li>• <b>wireframe</b> - displays only the outlines of the camera geometry.</li> <li>• <b>solid</b> - displays the camera geometry with a solid color.</li> </ul> |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <ul style="list-style-type: none"> <li>• <b>solid + lines</b> - displays the camera geometry as solid color with the camera's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + lines</b> - displays the wireframe plus the surface texture.</li> </ul>                                                                                                                                                                                                                                                                                                                            |
| selectable                                                                          | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the camera according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the camera as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the camera is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the camera is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the camera is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |
| transform order                                                                     | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rotation order | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| translate      | translate        | 0, 0, 0       | Lets you translate the camera along the x, y, and z axes. You can also adjust translate values by clicking and dragging the camera in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                 |
| rotate         | rotate           | 0, 0, 0       | Lets you rotate the camera around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                  |
| scale          | scaling          | 1, 1, 1       | Lets you scale the camera on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| uniform scale  | uniform_scale    | 1             | Lets you scale the camera simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| skew           | skew             | 0, 0, 0       | Lets you skew the camera on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to a camera's position, scaling, skewing, and rotation, these occur from the location of the camera's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the camera you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                          |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the camera's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| World matrix   | world_matrix     | N/A           | Displays the world or absolute xyz transform of the node in world coordinates.<br><br><div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                                                                                      |
| Projection Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| projection     | project_mode     | perspective   | Sets the camera projection type when projecting 2D textures: <ul style="list-style-type: none"> <li>• <b>perspective</b> - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture.</li> <li>• <b>orthographic</b> - objects are viewed using parallel projection.</li> <li>• <b>uv</b> - every object renders its UV space into the output format. Use this to cook out texture maps.</li> <li>• <b>spherical</b> - the entire 360° world is rendered as a spherical map.</li> </ul> |
| focal length   | focal            | 50            | Adjusts the camera's level of magnification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| horiz aperture | haperture        | 24.576        | Sets the horizontal aperture of the camera.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| vert aperture  | vaperture        | 18.672        | Sets the vertical aperture of the camera.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| near           | near             | 0.1           | Adjusts the position of the camera's forward clipping plane. Objects closer to the camera than this plane are not rendered.<br><br><div>  <b>Note:</b> The value for the <b>near</b> clipping plane must always be positive to produce a sensible result. </div>                                                                                                                                                                                       |
| far            | far              | 10000         | Adjusts the position of the camera's rearward clipping                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | plane. Objects farther from the camera than this plane are not rendered.                                                                                                                                                                                                                                                                                                                                      |
| window translate uv | win_translate    | 0, 0          | Translates the camera's output along the uv axes.                                                                                                                                                                                                                                                                                                                                                             |
| window scale uv     | win_scale        | 1, 1          | Scales the camera's output along the uv axes.                                                                                                                                                                                                                                                                                                                                                                 |
| window roll         | winroll          | 0             | Rotates the camera's output around the z axis.                                                                                                                                                                                                                                                                                                                                                                |
| focal distance      | focal_point      | 2             | Controls the distance from the lens where the camera focuses.                                                                                                                                                                                                                                                                                                                                                 |
| fstop               | fstop            | 16            | Sets the f-stop value (relative aperture) of the camera.                                                                                                                                                                                                                                                                                                                                                      |
| File Tab            |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                               |
| read from file      | read_from_file   | disabled      | <p>When disabled, the camera is configured using the controls on the <b>Camera</b> tab. Enable <b>read from file</b> if you want to read in camera information from a file using the <b>File</b> tab.</p> <div>  <b>Note:</b> This control is linked to the <b>read from file</b> control on the <b>Camera</b> tab. </div> |
| file                | file             | N/A           | Sets the file path from which you intend to import camera information.                                                                                                                                                                                                                                                                                                                                        |
| reload              | reload           | N/A           | Click to reload the camera information from the specified file.                                                                                                                                                                                                                                                                                                                                               |
| USD Options         | scene_graph      | N/A           | <p>When the <b>file</b> path is pointing to a valid <b>.usd</b> file, the <b>USD Options</b> are displayed.</p> <p>The <b>USD Options</b> show a scenegraph containing a list of the item names and their paths inside the <b>.usd</b> file.</p> <p>Click an item to select it and load it into the scene. The selected item can be identified in the <b>Load</b> column.</p>                                 |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                  |               | <p>Items in the <b>.usd</b> file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene.</p> <div>  <b>Note:</b> For more information about importing Cameras from a <b>.usd</b> file, see <a href="#">Importing USD Items</a>. </div> |
| animation stack name         | fbx_take_name    | N/A           | <p>When the <b>file</b> control is pointing to a valid file, select the required <b>take name</b> from the dropdown menu.</p> <div>  <b>Note:</b> This control is only displayed if you have selected an <b>.fbx</b> file in the <b>file</b> control. </div>               |
| node name                    | fbx_node_name    | N/A           | <p>When the <b>file</b> control is pointing to a valid file, select the required <b>node name</b> from the dropdown menu.</p> <div>  <b>Note:</b> This control is only displayed if you have selected an <b>.fbx</b> file in the <b>file</b> control. </div>             |
| frame rate                   | frame_rate       | 24            | <p>When <b>use frame rate</b> is enabled, enter the required frame rate to use instead of the rate specified in the input file.</p>                                                                                                                                                                                                                         |
| use frame rate               | use_frame_rate   | disabled      | <p>When enabled, the frame rate from the input file is ignored and the specified <b>frame rate</b> is used instead.</p>                                                                                                                                                                                                                                     |
| suppress confirmation dialog | suppress_dialog  | disabled      | <p>When enabled, importing new camera data does not display a confirmation prompt.</p>                                                                                                                                                                                                                                                                      |
| compute rotation             | compute_rotation | disabled      | <p>When enabled, compute the camera rotation values using the look up vector and look at position. The rotation values are always computed when there is a look at target.</p>                                                                                                                                                                              |

| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                     |
|-----------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Look Tab        |                      |               |                                                                                                                                                                              |
| look axis       | look_axis            | -Z            | The axis around which the Camera is rotated to face the <b>look</b> input.                                                                                                   |
| rotate X        | look_rotate_x        | enabled       | Determines whether the rotation occurs around the X axis. Note that for the rotation to truly "look at" the <b>look</b> input, all three of these options must be activated. |
| rotate Y        | look_rotate_y        | enabled       | Determines whether the rotation occurs around the Y axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options.   |
| rotate Z        | look_rotate_z        | enabled       | Determines whether the rotation occurs around the Z axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options.   |
| look strength   | look_strength        | 1             | Determines to what extent the Camera rotates to the new orientation. The smaller the value, the less the object is rotated. Setting the value to 0 produces no rotation.     |
| use quaternions | look_use_quaternions | disabled      | Uses an alternate scheme to calculate the <b>look</b> rotation. This option may be useful to smooth out erratic rotations along the look axis.                               |

# CameraTracker

CameraTracker (NukeX and Nuke Studio only) is designed to provide an integrated camera tracking or matchmoving tool, allowing you to create a virtual camera whose movement matches that of your original camera. Tracking camera movement in a 2D footage enables you to add virtual 3D objects to your 2D footage.



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                  |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Source          | The sequence whose camera movement you want to track.                                                                                                                                                     |
|                 | Mask            | <p>An optional input to use as a mask. By default, feature tracking is limited to the non-black areas of the mask.</p> <p>The <b>Mask</b> input is hidden until the <b>Source</b> input is connected.</p> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CameraTracker Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Input             |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Source            | sourceType       | Sequence      | <p>Sets the type of source footage you intend to track:</p> <ul style="list-style-type: none"> <li>• <b>Sequence</b> - designed to track a contiguous frame sequence with minimal intervention from you.</li> <li>• <b>Stills</b> - creates a camera track from reference frame stills taken on site. These represent the minimum number of frames required to cover your subject with sufficient overlap.</li> </ul>                                                                                                      |
| Mask              | ignore           | None          | <p>Set the mask type to exclude areas of the sequence when tracking:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the Mask input to define which areas to ignore.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                                          | <ul style="list-style-type: none"> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the Mask input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the Mask input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted Mask input alpha channel to define which areas to ignore.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Range        | trackRange       | Input                                    | <p>Sets the range of frames processed by CameraTracker:</p> <ul style="list-style-type: none"> <li>• <b>Input</b> - the default value, sets the frame range to the length of the sequence attached to the Source input.</li> <li>• <b>Global</b> - sets the tracking frame range to the range set in the <b>Project Settings &gt; frame range</b> controls. If no frame range is defined, the frame range of the first image you read in is used as the Global frame range.</li> <li>• <b>Custom</b> - sets a tracking range of frames described by the <b>from</b> and <b>to</b> fields.</li> <li>• <b>Reference Frames</b> - allows you to manually define keyframes in the sequence using the +/- buttons. You can also add keyframes to all frames or a specific frame range using the <b>Add</b> dropdown. This option should only be used if you have set <b>Source</b> to <b>Stills</b>.</li> </ul> |
| from         | trackStart       | Dependent on the <b>Project Settings</b> | When <b>Range</b> is set to <b>Custom</b> , this control sets the first frame to track in the footage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| to           | trackStop        | Dependent on the <b>Project Settings</b> | When <b>Range</b> is set to <b>Custom</b> , this control sets the last frame to track in the footage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Frames       | referenceFrames  | 0                                        | Displays the reference frames to track and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)                                                                      | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|----------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                            |               | <p>solve.</p> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div>                                                                                                                                                                                                                                                                                                                          |
|  | addReferenceFrame          | N/A           | <p>Adds the current frame to the set of frames to track and solve.</p> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div>                                                                                                                                                                                                                                                                 |
|  | deleteReferenceFrame       | N/A           | <p>Removes the current frame from the set of frames to track and solve.</p> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div>                                                                                                                                                                                                                                                          |
| Add                                                                               | addReference-FramesMenu    | Add           | <p>Allows you to quickly add reference frames:</p> <ul style="list-style-type: none"> <li>• <b>Add All</b> - Adds all frames based on the input's start and end range. Any missing frames on the input clip are skipped.</li> <li>• <b>Add Range</b> - Opens a dialog that lets you select a specific frame range to add.</li> </ul> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div> |
| Delete                                                                            | deleteReference-FramesMenu | Delete        | <p>Allows you to quickly remove reference frames:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <ul style="list-style-type: none"> <li>• <b>Delete All</b> - Removes all reference frames.</li> <li>• <b>Delete Range</b> - Opens a dialog that lets you select a specific frame range to remove.</li> </ul> <div>  <b>Note:</b> This control is only available when <b>Range</b> is set to <b>Reference Frames</b>.         </div>                                                                                                                  |
| Camera         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Principal View | principalView    | left          | <p>Sets the principal view where features are tracked and the <b>Mask</b> input is applied. The secondary camera is calculated relative to this <b>Principal View</b> camera.</p> <p>This control also appears on the <b>Settings</b> tab.</p> <div>  <b>Note:</b> Principal View is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).         </div> |
| Camera Motion  | cameraMotionLink | Free Camera   | <p>Sets the type of camera motion to compensate for:</p> <ul style="list-style-type: none"> <li>• <b>Rotation Only</b> - select this if the camera is stationary, but rotating.</li> <li>• <b>Free Camera</b> - select this if the camera is moving freely, rotating, and translating.</li> <li>• <b>Linear Motion</b> - select this if the camera motion is a straight, linear path.</li> <li>• <b>Planar Motion</b> - select this if the camera has a flat path, moving in a two-dimensional plane only.</li> </ul>                 |

| Control (UI)    | Knob (Scripting)       | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lens Distortion | lensDistortionTypeLink | No Lens Distortion | <p>Specifies the type of lens distortion expected:</p> <ul style="list-style-type: none"> <li>• <b>No Lens Distortion</b> - treats the footage as having no distortion. Use this option if the <b>Source</b> footage has already been corrected to remove lens distortion.</li> <li>• <b>Unknown Lens</b> - calculates the lens distortion automatically from the sequence (in the same way as the Image <b>Analysis</b> tab in the <a href="#">LensDistortion</a> node) and then refines the distortion in the camera solve.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Undistort Input | undistort              | off                | <p>When enabled, the <b>Source</b> is undistorted based on the calculated lens.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Focal Length    | focalLengthType        | Unknown Constant   | <p>Sets the focal length for the camera:</p> <ul style="list-style-type: none"> <li>• <b>Known</b> - select this option if the focal length is available and enter a value in the <b>Length</b> control.</li> <li>• <b>Approximate Varying</b> - select this option if an approximate focal length is available and enter keyframed focal length values in the <b>Length</b> control.</li> <li>• <b>Approximate Constant</b> - select this option if an approximate focal length is available and there is no zoom, and enter a focal length value in the <b>Length</b> control.</li> </ul> <div style="border: 1px solid orange; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> CameraTracker attempts to refine the focal length during the solve if you select an <b>Approximate</b> option.</p> </div> <ul style="list-style-type: none"> <li>• <b>Unknown Varying</b> - select this option if the focal length is unknown and changing.</li> <li>• <b>Unknown Constant</b> - this is the default</li> </ul> |

| Control (UI)      | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                     |               | option. Use this option if the focal length is unknown and there is no zoom.                                                                                                                                                                                                                                                                                                                                               |
| Length            | knownFocalLength    | 50            | Sets the focal length for approximate and known solves. You can animate this control to define a varying focal length. The units are the same as those used for the <b>Film Back Size</b> (mm or inches).                                                                                                                                                                                                                  |
| Film Back Preset  | filmBackSizePresets | Custom        | <p>Sets the <b>Film Back Size</b> controls automatically, depending on which preset you choose.</p> <p>The default setting allows you to enter your own settings manually.</p> <div>  <b>Tip:</b> You can add your own defaults by editing the <code>../NukeScripts/camerapresets.py</code> file in the Nuke installation package. </div> |
| Film Back Size xy | filmBackSize        | 36,24         | Sets the size of the camera imaging sensor. Specify the units you want to use by selecting either millimeters or inches in the <b>Units</b> dropdown. The units should match the units used for the <b>Length</b> .                                                                                                                                                                                                        |
| Units             | filmbackUnits       | mm            | Sets the unit of measure for the <b>Film Back Size</b> , either millimeters or inches.                                                                                                                                                                                                                                                                                                                                     |
| Analysis          |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Track             | trackFeatures       | N/A           | Click to begin auto-tracking using the controls specified in the <b>Settings</b> tab. Track defines a set of 2D feature tracks that correspond to fixed points, or features, in the scene.                                                                                                                                                                                                                                 |
| Update Track      | updateTrack         | N/A           | Click to display a frame range dialog, allowing                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | you to retrack part of the sequence, such as when you have extended the frame range or used some of the <b>Settings</b> tab <b>Tracking</b> refinement controls.                                                                                                                                                                                                                     |
| Clear Tracks | clearTrack       | N/A           | Click to clear all auto-tracking data. A confirmation message needs acknowledging before the action is completed.                                                                                                                                                                                                                                                                    |
| Solve        | solveCamera      | N/A           | Click to begin calculating the solve using the controls specified in the <b>Settings</b> tab. Solve calculates the camera path and projection creating a 3D point for each 2D feature track within a minimum projection error, including auto-tracks, User Tracks, and tracks created from imported Trackers.                                                                        |
| Update Solve | updateSolve      | N/A           | <p>Click to update the solve calculation, such as when you have extended the frame range or used some of the <b>Settings</b> tab <b>Solving</b> refinement controls.</p> <p>Recalculating the solve is handy when you want to see how good the solve is after you've refined it, without permanently deleting tracks. Recalculating the solve also recalculates stereo geometry.</p> |
| Clear Solve  | resetSolve       | N/A           | Click to clear all solve data. A confirmation message needs acknowledging before the action is completed.                                                                                                                                                                                                                                                                            |
| Error        | solveRMSE        | N/A           | Displays the RMS (root mean square) error of your solve, in pixels. As a general rule of thumb, if your solve reports an RMS projection rate higher than 1.0 pixel, you may want to consider fine-tuning your solve or tracking data.                                                                                                                                                |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| per frame     | solveError       | N/A           | Displays the RMS (root mean square) error of your solve at each frame, in pixels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Export        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| [export menu] | exportMenu       | Camera        | <p>Determines how the track and solve data is used when you click Create:</p> <ul style="list-style-type: none"> <li>• <b>Camera</b> - creates a single animated camera.</li> <li>• <b>Camera rig</b> - creates an animated camera for each view in the script and a JoinViews to node to pass the animation downstream.</li> <li>• <b>Scene</b> - creates a single animated camera, a point cloud from the solved 3D points, and a Scene node.</li> <li>• <b>Scene+</b> - creates a scene containing all the components included in the other create modes.</li> <li>• <b>Point cloud</b> - creates a point cloud from the solved 3D points.</li> <li>• <b>Distortion</b> - creates a LensDistortion node with <b>Undistort</b> disabled.</li> <li>• <b>Undistortion</b> - creates a LensDistortion node with <b>Undistort</b> enabled.</li> <li>• <b>Cards</b> - creates a 3D card for each solved frame in the sequence.</li> </ul> <div>  <b>Note:</b> Creating Cards from sequences can take long time, depending on the number of frames present. </div> |
| Create        | exportButton     | N/A           | Click to create the option specified in the export dropdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Link output   | linkOutput       | on            | When enabled, cameras and points are updated when the solve is updated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



| Control (UI)        | Knob (Scripting)    | Default Value                            | Function                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|---------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                     |                                          | If you disable linking, the expression link between the CameraTracker and Camera nodes is disconnected.                                                                                                                                                                                                                                                                                                 |
| New 3D              | new3D               | on                                       | <p>Sets the 3D system with which the <b>Export</b> nodes are compatible:</p> <p>When enabled, clicking the <b>Create</b> button adds the selected new 3D system nodes to the Node Graph. New 3D system nodes are red by default.</p> <p>When disabled, clicking the <b>Create</b> button adds the selected classic 3D system nodes to the Node Graph. Classic 3D system nodes are green by default.</p> |
| UserTracks Tab      |                     |                                          |                                                                                                                                                                                                                                                                                                                                                                                                         |
| User Track Views    | userTrackViews      | Dependent on the <b>Project Settings</b> | <p>You can only set up User Tracks in a maximum of two views. This control allows you to select which views correspond with the left (lx, ly) and right (rx, ry) 2D User Track location columns.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p>                              |
| [user tracks table] | userTracks          | N/A                                      | Displays positional information for any User Tracks in the script.                                                                                                                                                                                                                                                                                                                                      |
| Add Track           | addUserTrack        | N/A                                      | Click to add a User Track in the center of the Viewer.                                                                                                                                                                                                                                                                                                                                                  |
| Delete Tracks       | deleteUserTracks    | N/A                                      | Click to delete the current selections in the tracks list.                                                                                                                                                                                                                                                                                                                                              |
| Autotrack           | autotrackUserTracks | N/A                                      | Click to begin auto-tracking the current selections in the tracks list.                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)   | Knob (Scripting)   | Default Value                            | Function                                                                                                                                                                                                                                                                                        |
|----------------|--------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Update XYZ     | updateUserTrackXYZ | N/A                                      | Click to recalculate the XYZ coordinates of the current selections in the tracks list.                                                                                                                                                                                                          |
| Import Tracks  | importUserTracks   | N/A                                      | Click to import previously exported User Tracks.                                                                                                                                                                                                                                                |
| Export Tracks  | exportUserTracks   | N/A                                      | Click to export the current selections in the tracks list.                                                                                                                                                                                                                                      |
| Import Tracker | importTracker      | N/A                                      | Click to import track information from a Tracker node within the script.                                                                                                                                                                                                                        |
| Export Tracker | exportTracker      | N/A                                      | Click to export the current selections in the tracks list to a Tracker node within the script.                                                                                                                                                                                                  |
| AutoTracks Tab |                    |                                          |                                                                                                                                                                                                                                                                                                 |
| Solve Error    | SolveRMSE          | N/A                                      | Displays the RMS (root mean square) error of your solve, in pixels. As a general rule of thumb, if your solve reports an RMS projection rate higher than 1.0 pixel, you may want to consider fine-tuning your solve or tracking data.                                                           |
| per frame      | solveError         | N/A                                      | Displays the RMS (root mean square) error of your solve at each frame, in pixels.                                                                                                                                                                                                               |
| Curves View    | curvesView         | Dependent on the <b>Project Settings</b> | Sets the view for the track curves.<br><br>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).                                                                                       |
| [track curves] | trackCurves        | N/A                                      | Displays the following track and solve information in the form of curves: <ul style="list-style-type: none"> <li>• <b>num tracks</b> - the number of tracked features at each frame.</li> <li>• <b>track len - min</b> - the minimum length of the tracks at each frame (in frames).</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>track len - avg</b> - the average length of the tracks at each frame (in frames).</li> <li>• <b>track len - max</b> - the maximum length of the tracks at each frame (in frames).</li> <li>• <b>Min Length</b> - the threshold for minimum track length. You can adjust the minimum using the Min Length control.</li> <li>• <b>Solve Error</b> - displays the constant Solve Error parameter.</li> <li>• <b>error min</b> - the minimum reprojection error at each frame (in pixels).</li> <li>• <b>error rms</b> - the root mean reprojection error at each frame (in pixels).</li> <li>• <b>error track</b> - the maximum root mean reprojection error calculated over the track lifetime at each frame (in pixels).</li> <li>• <b>error max</b> - the maximum reprojection error at each frame (in pixels).</li> <li>• <b>Max Track Error</b> - displays the constant Max RMS Error parameter. You can adjust the maximum using the <b>Max Track Error</b> control.</li> <li>• <b>Max Error</b> - displays the Max Error threshold parameter. You can adjust the maximum using the <b>Max Error</b> control.</li> </ul> |

| Control (UI)    | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                        |
|-----------------|--------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Min Length      | minLengthThreshold | 0             | <p>Redefines your thresholds if you find your solve or camera output needs adjusting:</p> <ul style="list-style-type: none"> <li>• <b>Min Length</b> - increase the minimum length threshold to reject short tracks. You might find a lot of short tracks cropping up in long sequences with a slow camera movement.</li> </ul> |
| Max Track Error | maxRMSEThreshold   | 0             | <ul style="list-style-type: none"> <li>• <b>Max Track Error</b> - reduce this threshold to reject tracks based on RMS reprojection error.</li> <li>• <b>Max Error</b> - reduce this threshold to reject tracks with a large reprojection error in isolated frames.</li> </ul>                                                   |
| Max Error       | maxErrorThreshold  | 0             | <div>  <p><b>Note:</b> Feature tracks that fall within the threshold limits are called inliers, and are used when you recalculate a solve instead of starting from scratch.</p> </div>                                                         |
| Refinement      |                    |               |                                                                                                                                                                                                                                                                                                                                 |
| Refine Solve    | refineSolve        | N/A           | Click to attempt to refine the solve calculation using the methods outlined in the <b>Focal Length</b> , <b>Position</b> , and <b>Rotation</b> controls.                                                                                                                                                                        |
| Focal Length    | refineOptions      | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated <b>Focal Length</b> .                                                                                                                                                                                          |
| Position        | refineOptions      | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated camera position.                                                                                                                                                                                               |
| Rotation        | refineOptions      | off           | When enabled, clicking <b>Refine Solve</b> causes CameraTracker to finess the solve calculation using an updated camera orientation.                                                                                                                                                                                            |

| Control (UI)             | Knob (Scripting)     | Default Value | Function                                                                                                                                                                               |
|--------------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Delete Unsolved          | deleteInvalidTracks  | N/A           | Click to permanently delete tracks for which 3D points could not be calculated in the solve.                                                                                           |
| Delete Rejected          | deleteRejectedTracks | N/A           | Click to delete any tracks rejected by the threshold controls.                                                                                                                         |
| Delete Auto-tracks       | deleteAutoTracks     | N/A           | Click to delete all auto-tracks from the script, while retaining User Track and solve data. You can use this button to reduce the size of the script once you're happy with the solve. |
| Settings Tab             |                      |               |                                                                                                                                                                                        |
| Features                 |                      |               |                                                                                                                                                                                        |
| Number of Features       | numberFeatures       | 150           | Sets the number of features to track in each frame - ideally you should use more than 100 tracks per frame.                                                                            |
| Detection Threshold      | featureThreshold     | 0.1           | Sets the distribution of features over the input image. Low values track features evenly on all parts of the image.                                                                    |
| Feature Separation       | featureSpearation    | 12            | Sets the distribution of features in relation to each other. High values spread features at even distances over the image.                                                             |
| Refine Feature Locations | refineFeatures       | off           | When enabled, lock detected features to local corners. CameraTracker finds the closest corner point in your footage and locks feature points to them.                                  |
| Preview Features         | previewFeatures      | off           | When enabled, preview the potential features available for tracking. This allows you to check that the features cover the image. If not, tweak the tracking controls before tracking.  |
| Tracking                 |                      |               |                                                                                                                                                                                        |
| Minimum Length           | minTrackLength       | 3             | Sets a threshold value for the minimum track length to reject short tracks. You might find a                                                                                           |

| Control (UI)      | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                      |               | lot of short tracks cropping up in long sequences with a slow camera movement.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Track Threshold   | matchThreshold       | 0.69999999    | Controls how similar features look over a number of frames. You can adjust this value to test whether a track is reliable.                                                                                                                                                                                                                                                                                                                                                                                                                |
| Track Smoothness  | smoothnessThreshold  | 0.1           | Sets the threshold for smooth track generation. Adjusting this value can be useful in preventing poor tracks in complex sequences. Increase the smoothness value to remove tracks that glitch over time.                                                                                                                                                                                                                                                                                                                                  |
| Track Consistency | consistencyThreshold | 0             | Sets the threshold for consistent track generation. Increase this value to ensure track motion is locally consistent. Adjust consistency to prevent poor tracks in complex sequences.                                                                                                                                                                                                                                                                                                                                                     |
| Solving           |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Principal View    | principalView        | left          | <p>Sets the principal view where features are tracked and the <b>Mask</b> input is applied. The secondary camera is calculated relative to this <b>Principal View</b> camera.</p> <p>This control also appears on the <b>CameraTracker</b> tab.</p> <div>  <p><b>Note:</b> Principal View is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p> </div> |
| Camera Motion     | cameraMotion         | Free Camera   | <p>Sets the type of camera motion to compensate for:</p> <ul style="list-style-type: none"> <li>• <b>Rotation Only</b> - select this if the camera is</li> </ul>                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)                                                                                                                                                          | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                       |                             |               | <p>stationary, but rotating.</p> <ul style="list-style-type: none"> <li>• <b>Free Camera</b> - select this if the camera is moving freely, rotating, and translating.</li> <li>• <b>Linear Motion</b> - select this if the camera motion is a straight, linear path.</li> <li>• <b>Planar Motion</b> - select this if the camera has a flat path, moving in a two-dimensional plane only.</li> </ul> |
| Keyframe Spacing                                                                                                                                                      | keyFrameSeparation          | 0.30000001    | Controls the separation between keyframes. Use a high separation to spread keyframes out in long sequences with small camera movements. Use a low separation to generate more keyframes for fast camera moves.                                                                                                                                                                                       |
| Smoothness                                                                                                                                                            | motionSmoothness            | 0             | Adjusts the smoothness of your camera path. Increase this value to add weighting to the camera path and create a smoother result.                                                                                                                                                                                                                                                                    |
| Reference Frame                                                                                                                                                       | rootReferenceFrame          | 0             | When <b>Set reference frame</b> is enabled, specifies the first frame to use as a keyframe in the solve. This should be a frame where there is a large number of tracks distributed over the image with a good variation in depth.                                                                                                                                                                   |
| Set reference frame                                                                                                                                                   | setRootFrame                | off           | When enabled, use the Reference Frame field to manually define how keyframes are specified in the sequence. This can be useful if you have a difficult sequence to solve.                                                                                                                                                                                                                            |
| Stereo (These controls are only displayed if you have set up more than one view in your <b>Project Settings</b> , typically when working on a stereoscopic projects.) |                             |               |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Aligned Stereo Cameras                                                                                                                                                | alignSecondary Cameras      | on            | When enabled, the solve aligns secondary cameras to the principal camera position.                                                                                                                                                                                                                                                                                                                   |
| Constant Interaxial                                                                                                                                                   | constantInterAxial Distance | on            | When enabled, a constant interaxial distance is maintained between views.                                                                                                                                                                                                                                                                                                                            |

| Control (UI)                    | Knob (Scripting)               | Default Value | Function                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distance                        |                                |               |                                                                                                                                                                                                                                                                                                       |
| Interaxial Distance             | interAxialDistance             | 1             | <p>Sets a known interaxial distance for stereo views to define the scene scale.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p>                                             |
| Constant Interaxial Convergence | constantInterAxial Convergence | on            | When enabled, a constant interaxial convergence is maintained between views.                                                                                                                                                                                                                          |
| Display                         |                                |               |                                                                                                                                                                                                                                                                                                       |
| Show tracks                     | displayTracks                  | on            | When enabled, the individual tracks generated during analysis are displayed in the Viewer.                                                                                                                                                                                                            |
| Show projected 3D point         | displayReprojected             | on            | When enabled, circular highlights are displayed around the reprojected points in the 2D Viewer. Hover over points to display track length and reprojection error information.                                                                                                                         |
| Show key tracks only            | keyframePointsOnly             | off           | When enabled, only the longest tracks used to calculate the solve are displayed in the Viewer.                                                                                                                                                                                                        |
| Show 3D marker                  | displayMarker                  | off           | <p>When enabled, cone shaped 3D markers are displayed on your points in the 3D Viewer.</p> <div>  <b>Note:</b> When <b>Show 3D marker</b> is enabled, set the size of the markers using the scale controls. </div> |
| Scene Tab                       |                                |               |                                                                                                                                                                                                                                                                                                       |
| [scale                          | scaleConstraints               | N/A           | Displays known distances for scale constraints                                                                                                                                                                                                                                                        |



| Control (UI)                                                                        | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| constraints table]                                                                  |                        |               | against a measured distance between two solved points in the scene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Delete Constraints                                                                  | deleteScaleConstraints | N/A           | Click to delete the selected scale constraints.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Scene Transform                                                                     |                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|    | file_menu              | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu              | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the scene is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the scene is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the scene is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                                        |
| rotation order                                                                      | rot_order              | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                        |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| translate xyz  | translate        | 0,0,0         | Translates the scene along the x, y, and z axes. You can also adjust translate values by clicking and dragging the handles in the 3D Viewer.                                                                                                                                                                                                    |
| rotate xyz     | rotate           | 0,0,0         | Rotates the scene around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                      |
| scale xyz      | scale            | 0,0,0         | <p>Scales the scene around the x, y, and z axes. You can adjust scale values by holding down <b>Ctrl/Cmd+Shift</b> and dragging in the 3D Viewer.</p> <div>  <b>Note:</b> This control is only displayed if you've scaled the scene on individual axes. </div> |
| uniform scale  | uniform_scale    | 1             | Scales the scene simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                        |
| Local matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                 |
| specify matrix | useMatrix        | off           | When enabled, specify matrix values for the object you're transforming as an alternative to setting transform and scale values above.                                                                                                                                                                                                           |
| [matrix]       | local_matrix     | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                           |
| World matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                 |
| [matrix]       | world_matrix     | N/A           | Displays the world or absolute xyz transform                                                                                                                                                                                                                                                                                                    |

| Control (UI)          | Knob (Scripting)    | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|---------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                     |                    | of the node in world coordinates.<br><br><div> <b>Note:</b> You can't adjust the <b>World matrix</b> manually.</div>                                                                                                                                                                                                                                                                                                                             |
| Reset Scene Transform | resetSceneTransform | N/A                | Click to reset any transforms applied to the scene to the default value.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Output Tab            |                     |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Camera                |                     |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Translate xyz         | camTranslate        | 0,0,0              | Sets the translate values for the virtual camera's position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rotate xyz            | camRotate           | 0,0,0              | Sets the rotation values for the virtual camera's position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Focal Length          | focalLength         | 0                  | Sets the focal length for the virtual camera.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Aperture xy           | aperture            | 0,0                | Sets the aperture angle for the virtual camera.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Window Translate xy   | windowTranslate     | 0,0                | Sets the center point offset for the camera projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Window Scale xy       | windowScale         | 0,0                | Sets the relative pixel scaling value for the camera projection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Lens                  |                     |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Lens Distortion       | lensDistortionType  | No Lens Distortion | Specifies the type of lens distortion expected: <ul style="list-style-type: none"> <li>• <b>No Lens Distortion</b> - treats the footage as having no distortion. Use this option if the <b>Source</b> footage has already been corrected to remove lens distortion.</li> <li>• <b>Unknown Lens</b> - calculates the lens distortion automatically from the sequence (in the same way as the Image <b>Analysis</b> tab in the <a href="#">LensDistortion</a> node) and then refines the distortion in the camera solve.</li> </ul> |

| Control (UI)            | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| Lens Type               | lensType             | Spherical     | Sets the lens type that CameraTracker should expect: <b>Spherical</b> or <b>Anamorphic</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Radial Distortion 1     | distortion1          | 0             | Sets the first radial distortion term. This is proportional to $r^2$ , where $r$ is the distance from the distortion center.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Radial Distortion 2     | distortion2          | 0             | Sets the second radial distortion term, proportional to $r^4$ .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Distortion Center xy    | distortionCenter     | 0,0           | Sets the values for the center of the radial distortion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Anamorphic Squeeze      | anamorphicSqueeze    | 1             | When <b>Lens Type</b> is set to <b>Anamorphic</b> , defines anamorphic squeeze - the distortion in x is scaled by this amount.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Asymmetry Distortion xy | asymmetricDistortion | 0,0           | When <b>Lens Type</b> is set to <b>Anamorphic</b> , defines asymmetric distortion to correct for slight misalignments between multiple elements in the lens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Undistort Input         | undistort            | off           | When enabled, the <b>Source</b> is undistorted based on the calculated lens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| filter                  | filter               | Cubic         | <p>When <b>Undistort Input</b> is enabled, sets the filtering algorithm to used. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>curve).</p> <ul style="list-style-type: none"> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moiré patterns).</li> </ul> |

## Card Parameters

|           |           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------|-----------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scale xyz | cardScale | 1,1,1 | Equivalent value for the <b>scale</b> parameter on the <a href="#">Card</a> node, used to produce horizontal scale in conjunction with the <b>Radial Distortion</b> controls.                                                                                                                                                                                                                                                                                                             |
| a (r^3)   | a         | 0     | <p>Equivalent value for the <b>a (r^3)</b> control on <b>LensDistortion</b> tab of the <a href="#">Card</a> node. Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion.</p> <p>Positive values make the card rounder, negative make the corners sharper.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $b (r^2)$    | b                | 0             | <p>Equivalent value for the <b>b (<math>r^2</math>)</b> control on <b>LensDistortion</b> tab of the <a href="#">Card</a> node. Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion.</p> <p>Positive values make the card rounder, negative make the corners sharper.</p> |
| $c (r^1)$    | c                | 0             | <p>Equivalent value for the <b>c (<math>r^1</math>)</b> control on <b>LensDistortion</b> tab of the <a href="#">Card</a> node. Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>This allows you to distort an image projected onto a card in 3D, for example, to simulate camera lens distortion effects, such as barrel distortion.</p> <p>Positive values make the card rounder, negative make the corners sharper.</p> |

# Card

The Card node creates the simplest type of object you can add to a 3D scene - a plane onto which you can map a texture. A card object may be distorted using the **Lens Distortion** tab or deformed as a bilinear or bicubic object using the **Deform** tab.

## Inputs and Controls

| Connection Type | Connection Name | Function                                        |
|-----------------|-----------------|-------------------------------------------------|
| Input           | img             | The texture you want to project on to the card. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Card Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| display        | display          | textured      | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable     | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| render         | render_mode      | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| cast shadow    | cast_shadow      | enabled       | When enabled, the card object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| receive shadow | receive_shadow   | enabled       | When enabled, and a material shader has been added, the card object can have shadows cast onto it by other objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)                                                                        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| frame range                                                                         | range_first       | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                               |
|                                                                                     | range_last        | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                                 |
| orientation                                                                         | orientation       | XY            | Set the orientation of the card on the XY, YZ, or ZX axes.                                                                                                                                                                                                                                                                          |
| image aspect                                                                        | image_aspect      | enabled       | When enabled, the card is the same shape as the input image. Disable <b>imageaspect</b> to fit the input image on a square card.                                                                                                                                                                                                    |
| rows/columns                                                                        | rows              | 8             | The number of rows in the selection grid. The maximum value is 4096, but high values may cause instability.                                                                                                                                                                                                                         |
|                                                                                     | columns           | 8             | The number of columns in the selection grid. The maximum value is 4096, but high values may cause instability.                                                                                                                                                                                                                      |
| z                                                                                   | z                 | 0             | The card is placed this far from the origin and scaled in line with the <b>lens-in focal</b> distance and <b>lens-in haperture</b> value.                                                                                                                                                                                           |
| lens-in focal                                                                       | lens_in_focal     | 1             | This is the focal length of the camera that took the picture on the card. The card is scaled to the correct size so that at distance <b>z</b> it fills this field of view.                                                                                                                                                          |
| lens-in haperture                                                                   | lens_in_haperture | 1             | This is the horizontal aperture of the camera that took the picture on the card. The card is scaled to the correct size so that at distance <b>z</b> it fills this field of view.                                                                                                                                                   |
|  | file_menu         | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the card according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given</li> </ul> |



| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the card as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                           |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the card is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the card is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the card is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                               |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                  |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the card along the x, y, and z axes. You can also adjust translate values by clicking and dragging the card in the 3D Viewer.                                                                                                                                                                                                                                                                                                                               |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the card around the x, y, and z axes. you can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                              |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the card on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the card simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the card on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| pivot                                                                             | pivot            | 0, 0, 0       | When you make changes to a 3D object's position,                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                   |               | <p>scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix        |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| specify matrix      | useMatrix         | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                            |
| matrix              | matrix            | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                  |
| Lens Distortion Tab |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| lock to vertical    | use_vertical_lock | disabled      | When enabled, the distortion is limited to the width - vertical distortion is locked.                                                                                                                                                                                                                                                                                                                                                                                  |
| $a (r^3)$           | lens_in_distort_a | 0             | <p>Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card.</p> <p>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.</p>                                                                                                                                              |
| $b (r^2)$           | lens_in_distort_b | 0             | Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)   | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                   |
|----------------|--------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                    |               | card.<br><br>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.                                                                                                                                                          |
| c (r^1)        | lens_in_distort_c  | 0             | Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card.<br><br>Positive values make the card rounder, negative make the corners sharper. The lens distort values can be used to simulate camera lens distortion effects, such as barrel distortion.                                        |
| distortion     | lens_in_distortion | 0             | Applies a lens distortion effect using an older Nuke algorithm. Smaller values make the edges of the card rounder, large values make the corners sharper.                                                                                                                                                                                                  |
| power          | lens_in_power      | 4             | Controls the strength of the <b>distortion</b> parameter on the card.                                                                                                                                                                                                                                                                                      |
| Deform Tab     |                    |               |                                                                                                                                                                                                                                                                                                                                                            |
| type           | type               | none          | Select the deform type from the dropdown menu:<br><ul style="list-style-type: none"> <li>• <b>none</b> - the card is not deformed.</li> <li>• <b>bilinear</b> - the card is deformed using handles and the <b>bilinear</b> controls.</li> <li>• <b>bicubic</b> - the card is deformed using handles, tangents, and the <b>bicubic</b> controls.</li> </ul> |
| reset handles  | reset_handles      | N/A           | Click to reset the handles and tangents to their default position. A warning displays to confirm the reset.                                                                                                                                                                                                                                                |
| reset tangents | reset_tangents     | N/A           | When <b>break tangents</b> is disabled, click to reset the tangents to a third of the distance between their handle points to smooth out the deform curves. A warning displays to confirm the reset.                                                                                                                                                       |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Note:</b> This control has no effect when <b>type</b> is set to <b>bilinear</b> . |
| copy         | copy_shape       | N/A           | Click to copy the current handle and tangent positions into a temporary buffer.                                                                                        |
| paste        | paste_shape      | N/A           | Click to paste the handle and tangent positions from the temporary buffer onto the card.                                                                               |
| set key      | set_key_shape    | N/A           | Click to set a key for this frame on the handles and tangents.                                                                                                         |
| delete key   | del_key_shape    | N/A           | Click to delete a key from this frame on the handles and tangents.                                                                                                     |
| delete anim  | del_anim_shape   | N/A           | Click to delete the entire animation of all handles and tangents.                                                                                                      |
| Bilinear     |                  |               |                                                                                                                                                                        |
| x/y points   | x_points         | 3             | Sets the number of x/y control points in the grid. The grid is not modified until you click <b>new shape</b> .                                                         |
|              | y_points         | 3             |                                                                                                                                                                        |
| new shape    | new_shape        | N/A           | Click to apply the current <b>x/y points</b> values to the grid. A warning displays to confirm the new shape.                                                          |
| x subdivide  | x_subdivide      | N/A           | Subdivides the control points on the x axis creating new points equal to <b>x points</b> - 1.                                                                          |
| y subdivide  | y_subdivide      | N/A           | Subdivides the control points on the y axis creating new points equal to <b>y points</b> - 1.                                                                          |
| uv position  | uv_position      | 0.3525        | Sets the position of the uv subdivide handle.                                                                                                                          |
| uv subdivide | uv_subdivide     | N/A           | Click to subdivide the card at the <b>uv position</b> . If the uv subdivide handle is on the card edge then only the u or v is subdivided.                             |
| u subdivide  | u_subdivide      | N/A           | Subdivide the card at the u position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| v subdivide  | v_subdivide      | N/A           | Subdivide the card at the v position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| cp           | control_points   | N/A           | <p>This collection of controls is used to navigate around the control points on the card. The index starts at 0 and each control point is described by column/row locations and three <b>xyz</b> coordinates.</p> <ul style="list-style-type: none"> <li>• The left and right arrows change the column index of the control point.</li> <li>• The up and down arrows change the row index of the control point.</li> </ul> |
| Bicubic      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| x/y points   | x_points         | 3             | Sets the number of x/y control points in the grid. The grid is not modified until you click <b>new shape</b> .                                                                                                                                                                                                                                                                                                             |
|              | y_points         | 3             |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| new shape    | new_shape        | N/A           | Click to apply the current <b>x/y points</b> values to the grid. A warning displays to confirm the new shape.                                                                                                                                                                                                                                                                                                              |
| x subdivide  | x_subdivide      | N/A           | Subdivides the control points on the x axis creating new points equal to <b>x points</b> - 1.                                                                                                                                                                                                                                                                                                                              |
| y subdivide  | y_subdivide      | N/A           | Subdivides the control points on the y axis creating new points equal to <b>y points</b> - 1.                                                                                                                                                                                                                                                                                                                              |
| uv position  | uv_position      | 0.3525        | Sets the position of the uv subdivide handle.                                                                                                                                                                                                                                                                                                                                                                              |
| uv subdivide | uv_subdivide     | N/A           | Click to subdivide the card at the <b>uv position</b> . If the uv subdivide handle is on the card edge then only the u or v is subdivided.                                                                                                                                                                                                                                                                                 |
| u subdivide  | u_subdivide      | N/A           | Subdivide the card at the u position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| v subdivide  | v_subdivide      | N/A           | Subdivide the card at the v position. If the uv subdivide handle is on the card edge then there is no subdivision.                                                                                                                                                                                                                                                                                                         |
| x/y points   | x_points         | 3             | Sets the number of x/y control points in the grid. The grid is not modified until you click <b>new shape</b> .                                                                                                                                                                                                                                                                                                             |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|-------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| uniform subdivide | uniform_subdivide | enabled       | When enabled, the tangents are shortened to create a more uniform subdivide.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| break tangent     | break_tangent     | disabled      | This control is present for the purposes of backward compatibility and should not be used in new scripts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| mirror tangent    | mirror_tangent    | disabled      | This control is present for the purposes of backward compatibility and should not be used in new scripts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| cp                | control_points    | N/A           | <p>This collection of controls is used to navigate around the control points on the card. The index starts at 0 and each control point is described by two grid locations and <b>xyz</b> values corresponding to the position, right tangent, left tangent, up tangent, and down tangent - tangent values are relative to the position value.</p> <ul style="list-style-type: none"> <li>• The left and right arrows change the column index of the control point.</li> <li>• The up and down arrows change the row index of the control point.</li> </ul> <div>  <b>Note:</b> Control points along the edge of the card only display tangent values if they are valid. For example, the lower left corner control point only displays the up and right tangents. </div> |

# CrosstalkGeo

With the CrosstalkGeo node, you can move the XYZ points on your geometry using the crosstalk curves for each axis.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                  |
|-----------------|-----------------|-----------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object whose vertices you want to adjust. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CrosstalkGeo Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| display            | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hide the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable         | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| render             | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| [crossover curves] | crossover        | N/A           | <p>From the curve list on the left, select the curve you want to modify.</p> <p>For example, you'd select <b>z</b> to only modify the vertex z</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | values.<br><br>You can also select <b>y-&gt;x</b> , for example, to use the vertex y value to evaluate the curve and add the result to the vertex x value. Adjust the curve as necessary. To insert points on the curve, <b>Ctrl/Cmd+Alt</b> +click on the curve. |
| Reset        | N/A              | N/A           | Resets the selected curves to their initial positions.                                                                                                                                                                                                            |

# Cube

The Cube node creates an adjustable cube in a 3D scene. You can map a texture on to the cube by attaching an image to the **img** input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                  |
|-----------------|-----------------|-----------------------------------------------------------|
| Input           | img             | The texture you want to project on to the object's faces. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cube Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                 |
| display      | display          | textured      | Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's</li> </ul> |



| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>geometry.</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable      | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                 |
| render          | render_mode      | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                          |
| cast shadows    | cast_shadow      | enabled       | When enabled, the cube object can cast shadows.                                                                                                                                                                                                                                                                                                                                                     |
| receive shadows | receive_shadow   | enabled       | When enabled, and a material shader has been added, the cube object can have shadows cast onto it by other objects.                                                                                                                                                                                                                                                                                 |
| frame range     | frame_first      | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                                                                                               |
|                 | frame_last       | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                                                                                                 |
| rows/columns    | rows             | 10            | Sets the number of rows on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                                                                                                |
|                 | columns          | 10            | Sets the number of columns on each face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                                                                                             |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| separate faces                                                                      | separate_faces   | enabled       | <p>When enabled, the vertices that describe the separate cube faces do not share UV coordinate information.</p> <p>Disable this control when you want to guarantee that the edges of connected faces share vertices.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| cube                                                                                | cube             | -0.5, 0.5     | <p>Specifies the dimensions of the cube (from a positive z axis viewpoint):</p> <ul style="list-style-type: none"> <li>• <b>x</b> - controls the left face on the x axis.</li> <li>• <b>y</b> - controls the bottom face on the y axis.</li> <li>• <b>n</b> - controls the back face on the z axis.</li> <li>• <b>r</b> - controls the right face on the x axis.</li> <li>• <b>t</b> - controls the top face on the y axis.</li> <li>• <b>f</b> - controls the front face on the z axis.</li> </ul>                                                                                                                                          |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                        |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| specify matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                             |
| matrix          | matrix           | N/A           | The matrix displays values from the object's transform,                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# Cylinder

The Cylinder node creates an adjustable cylinder in a 3D scene. You can map a texture on to the cylinder by attaching an image to the **img** input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | img             | The texture you want to project on to the object's face. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cylinder Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| display      | display          | textured      | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                           |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>color with the object's geometry outlines.</p> <ul style="list-style-type: none"> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable      | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                |
| render          | render_mode      | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                         |
| cast shadows    | cast_shadow      | enabled       | When enabled, the cylinder object can cast shadows.                                                                                                                                                                                                |
| receive shadows | receive_shadow   | enabled       | When enabled, and a material shader has been added, the cylinder object can have shadows cast onto it by other objects.                                                                                                                            |
| frame range     | frame_first      | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                              |
|                 | frame_last       | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                |
| rows/columns    | rows             | 30            | Sets the number of rows on the outer face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                          |
|                 | columns          | 30            | Sets the number of columns on the outer face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                       |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| radius                                                                              | radius           | 1             | Sets the radius of the cylinder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| height                                                                              | height           | 2             | Sets the height of the cylinder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| u extent                                                                            | u_extent         | 360           | <p>Sets the extent to which the input image wraps around the cylinder without extrapolating from the image edges.</p> <p>For example, a value of 180 wraps the input image halfway around the cylinder and closes any remainder by extrapolating from the edges of the input image.</p>                                                                                                                                                                                                                                                                                                                                                      |
| close top                                                                           | close_top        | disabled      | When enabled, the top of the cylinder is closed off. The input image is extrapolated from the edge to the center of the cylinder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| close bottom                                                                        | close_bottom     | disabled      | When enabled, the bottom of the cylinder is closed off. The input image is extrapolated from the edge to the center of the cylinder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the</li> </ul>                                                                                                                                                                                                                                                      |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | object is snapped to a new position, orientation, and size depending on the points selected.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                        |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                       |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# DepthGenerator

The DepthGenerator node (NukeX and Nuke Studio only) allows you to generate a depth map from your footage. The node uses information from a tracked camera to create a channel that displays variations in depth.

A depth map is an image that uses the brightness of each pixel to specify the distance between the 3D scene point and the virtual camera used to capture the scene.

DepthGenerator also allows you to output depth as normals and position passes, and create a [Card3D](#) node positioned in 3D space and displaced according to the depth channel.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                             |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Mask            | <p>The mask used to ignore areas of the source image. DepthGenerator expects alpha values of either 0 (for regions to use) or 1 (for regions to ignore).</p> <p>Depth can only be calculated where the real world 3D position of</p> |



| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | <p>objects doesn't change. If there are moving objects in your <b>Source</b> footage, DepthGenerator is likely to struggle to create an accurate depth map for those regions. To prevent this, you can exclude moving foreground regions from the depth calculation by connecting a matte to this input and setting <b>Ignore Mask</b> in the DepthGenerator properties to the channel that contains the matte.</p> <p>The <b>Mask</b> input only appears once you've connected the other two inputs.</p> |
|                 | Camera          | A tracked Camera that matches the Source footage. If necessary, you can create one using the <a href="#">CameraTracker</a> node.                                                                                                                                                                                                                                                                                                                                                                          |
|                 | Source          | The source footage from which the Camera track was derived.                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DepthGenerator Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Ignore Mask        | ignoreMask       | None          | <p>Sets the mask type to exclude areas of the <b>Source</b> footage during depth calculation. DepthGenerator expects values of either 0 (for regions to use) or 1 (for regions to ignore).</p> <p>Depth can only be calculated where the real world 3D position does not change. If your <b>Source</b> footage includes moving foreground objects, it's a good idea to supply a mask to prevent distortion in moving regions:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the <b>Source</b> clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the <b>Source</b> clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the <b>Mask</b> input to define which areas to ignore.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the <b>Mask</b> input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted <b>Mask</b> input alpha channel to define which areas to ignore.</li> </ul> <p>Alternatively, you can try using a smaller <b>Frame Separation</b> to capture moving objects.</p> |
| Output        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Depth Output  | outputType       | Depth (1/Z)   | <p>Sets the type of output produced:</p> <ul style="list-style-type: none"> <li>• <b>Depth 1/Z</b> - output 1/Z where Z is the distance along the camera Z axis. This matches the depth output of the <a href="#">ScanlineRender</a> node.</li> <li>• <b>Distance</b> - output the distance along the ray from the camera center to the 3D surface point.</li> </ul>                                                                                                                                             |
| Create Card   | createCard       | N/A           | <p>Click to create a group containing a displaced Card to visualize depth as a surface in 3D space.</p> <div>  <b>Note:</b> The <b>DepthOutput</b> control must be set to <b>Depth (1/Z)</b>.         </div>                                                                                                                                                                                                                  |
| Surface Point | P_channel        | none          | <p>Sets the channel(s) to output depth as a position pass.</p> <p>The position pass includes the X, Y, and Z coordinates for each pixel in the image. You can use it with the</p>                                                                                                                                                                                                                                                                                                                                |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <a href="#">Relight</a> node, or with the <a href="#">PositionToPoints</a> node to visualize depth as a 3D point cloud.                                                                                                                                                                                                                                                                                                                                             |
| Surface Normal   | N_channel        | none          | <p>Sets the channel(s) to output depth as a normals pass. Use the <b>NormalDetail</b> control to affect the smoothness of the normals pass.</p> <p>The normals pass contains three vectors of information for each pixel in the image: X direction, Y direction, and Z direction. In other words, it stores the direction in which each point in the image is facing. You can use a normals pass with the <a href="#">Relight</a> node.</p>                         |
| Frame Separation |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Analyze Sequence | analyzeSequence  | N/A           | <p>Click to automatically calculate the <b>FrameSeparation</b> to use in the sequence.</p> <p>For this to work, the camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p> <div>  <b>Note:</b> If you analyze the sequence and only then decide to add an ignore mask, you should analyze the sequence again after adding the mask. </div> |
| Analyze Frame    | analyzeFrame     | N/A           | <p>Click to calculate the <b>Frame Separation</b> to use at the playhead frame.</p> <p>This gives you more control than <b>Analyze Sequence</b>, as you can work through the timeline, analyze particular frames, and if necessary tweak the <b>Frame Separation</b> value manually.</p> <p>The camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p>                                                                        |
| Frame            | frameSeparation  | 1             | Adjusts the offset between the current frame and the                                                                                                                                                                                                                                                                                                                                                                                                                |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Separation          |                  |               | <p>frame against which to calculate depth for your input.</p> <p>Use a small separation value for fast camera moves and a larger value for slow camera moves.</p> <p>Increasing the separation gives a larger baseline and more accurate depth. However, a high separation reduces the quality of image matching and gives incorrect 3D points.</p> <p>Animate the <b>FrameSeparation</b> to compensate for variable camera speeds.</p> <p>The camera in the <b>Camera</b> input must be defined for all frames within the frame range.</p> <div>  <b>Note:</b> The <b>Analyse Sequence</b> and <b>Analyse Frame</b> buttons attempt to calculate the best separation. </div> |
| Calculated Accuracy | accuracy         | N/A           | <p>Displays the depth accuracy calculated when analyzing frame separation. Values closer to 1 are considered accurate, and values closer to 0 inaccurate.</p> <p>Use frames with a high accuracy when placing elements in 3D (for example, by clicking <b>Create Card</b> or using a PositionToPoints node).</p> <p>If you're not getting accurate depth values, try adjusting <b>Frame Separation</b> or using an <b>Ignore Mask</b>.</p>                                                                                                                                                                                                                                                                                                                     |
| Depth Generation    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Depth Detail        | vectorDetail     | 0.5           | <p>Adjust this to vary the resolution of the images used to calculate the depth map. The default value of 0.5 equals half the image resolution. Lower values speed up processing and deliver a smoother result. Higher</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | values pick up finer details, but also increase processing time.                                                                                                                                                                                                                                                                                                              |
| Normal Detail   | normalDetail     | 0.25          | <p>Adjusts the resolution of the surface normals. Reduce the detail to smooth out the normals pass.</p> <p>The default value of 0.25 causes the normals pass to be calculated at a quarter resolution.</p>                                                                                                                                                                    |
| Noise           | noiseLevel       | 0.01          | <p>Sets the amount of noise to ignore in the input footage when calculating the depth map.</p> <p>Try increasing this to smooth depth in flat image regions.</p>                                                                                                                                                                                                              |
| Strength        | strength         | 1             | <p>Sets the strength in matching pixels between frames. Increase this to force the matches, for example where fine details are missed, or reduce to smooth depth.</p> <p>In most cases, you can leave this at the default value.</p>                                                                                                                                          |
| Sharpness       | sharpness        | 0.5           | <p>Defines how distinct object boundaries should be. Increase sharpness to separate objects and reduce it to smooth depth.</p>                                                                                                                                                                                                                                                |
| Smoothness      | smoothness       | 0.5           | <p>Adjusts the smoothness weighting of the disparity calculation. Rather than affecting the depth calculation, this applies an intelligent blur on the result.</p> <p>A high smoothness can miss lots of local detail, but is less likely to produce noisy depth values. A low smoothness will concentrate on detail matching, even if the resulting depth map is jagged.</p> |
| Depth Limits    |                  |               |                                                                                                                                                                                                                                                                                                                                                                               |
| Near Clip Plane | near             | 0.1           | Sets the minimum z depth. All depth values that are lower than this number are set to this value.                                                                                                                                                                                                                                                                             |
| Far Clip Plane  | far              | 10000         | Sets the maximum z depth. All depth values that are                                                                                                                                                                                                                                                                                                                           |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                             |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | higher than this number are set to this value.                                                                       |
| Mark Bad Regions | markRegions      | disabled      | When enabled, the regions where the depth calculation is ambiguous are marked in the depth map as very large values. |

# DepthToPoints

DepthToPoints is a gizmo containing the [DepthToPosition](#) and [PositionToPoints](#) nodes. It can be used to generate a 3D point cloud from a depth pass and 3D camera.

See also [DepthToPosition](#), [PositionToPoints](#), [DepthGenerator](#), and [Camera](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                  |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | camera          | The camera required by the DepthToPosition node to create the position pass from the depth pass.                                          |
|                 | image           | The image from which the point cloud is generated, and where all the depth data resides. This is also where the color information for the |

| Connection Type | Connection Name | Function                                                                                                                                |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | point cloud is taken from.                                                                                                              |
|                 | norm            | The image containing normals data. Note that this input takes the place of the channels specified in the <b>surface normal</b> control. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| display        | display          | solid         | <p>Adjusts the display characteristics of 3D objects. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable     | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| render         | render_mode      | solid         | Sets how the points will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| cast shadow    | cast-shadow      | enabled       | When enabled, and a material shader is added to the object, the object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| receive shadow | receive_shadow   | enabled       | When enabled, and a material is added to the object, the object can receive shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| frame range    | range_first      | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                            |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | be used to display the offset used in the TimeOffset node.                                                                                                                          |
|                | range_last       | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node. |
| depth          | depth            | depth.Z       | Sets the channel that you want to use for the depth.                                                                                                                                |
| invert depth   | invert           | disabled      | Invert the depth before processing the depth pass image. This is best used when the depth channel is z, as opposed to 1/z.                                                          |
| surface normal | N_channel        | none          | The point normals are taken from these channels in the first input. If the <b>norm</b> input is used, these channels are ignored.                                                   |
| point detail   | detail           | 0.5           | Controls the number of available points to display in the Viewer. A value of 0 means no points are displayed. A value of 1 displays all available points.                           |
| point size     | pointSize        | 5             | Controls the display size of the points in the Viewer.                                                                                                                              |

# DepthToPosition

Generates a position pass from a depth pass and a 3D camera.

See also [DepthToPoints](#), [PositionToPoints](#), [DepthGenerator](#), and [Camera](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                   |
|-----------------|-----------------|--------------------------------------------------------------------------------------------|
| Input           | camera          | The 3D tracked camera that corresponds to the image input.                                 |
|                 | image           | The image from which the position pass is generated, and where all the depth data resides. |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                     |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
| DepthToPosition Tab |                  |               |                                                                                                                              |
| output              | output           | rgb           | Specifies the channels the output position pass is put into, and includes the option to create a new layer for this purpose. |
| depth               | depth            | depth.Z       | Sets the channel that you want to use for the depth.                                                                         |
| invert depth        | invert           | disabled      | Invert the depth before processing the depth pass image. This is best used when the depth channel is z, as opposed to 1/z.   |
| far                 | far              | 10000         | Specifies a value at which depth beyond this distance from the camera are ignored when calculating the position pass.        |

# Diffuse

The Diffuse node lets you adjust the color of an illuminated material in a scene. The material appears darker as the surface points away from the light.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | map             | The image used to modulate the diffuse properties of the material.                                                                                                                                                                                                                    |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Diffuse Tab  |                  |               |                                                                                                                                                                                                                                                                                                 |
| channels     | channels         | rgba          | The effect is only applied to these channels.<br><br>You can use the checkboxes on the right to select individual channels.                                                                                                                                                                     |
| white        | white            | 0.18          | The color of the material when illuminated. Note that when you have an image connected to the unnamed input of the node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the white value does not have any effect in the 3D Viewer. |

# Direct

Direct lights emit parallel light in one direction and appear to illuminate all objects with equal intensity, as if it was coming from a far away source - you can use direct light to simulate sunlight and moonlight, for example. Being at an infinite distance from the objects, direct light has orientation, but no position. To generate accurate shadows from a Direct light, view the scene through the light (using the Viewer's camera dropdown menu, just like a camera) and adjust the Direct light's scale control so that the part of the scene that should cast shadows fits within the view. This ensures that none of the shadow-casting geometry is missed by the depth map.

See also [Light](#), [Spot](#), [Point](#), [Environment](#), and [Relight](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                  |
|-----------------|-----------------|-------------------------------------------|
| Input           | unnamed         | An Axis, a Camera, or another Light node. |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DirectLight Tab                                                                     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| color                                                                               | color            | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| intensity                                                                           | intensity        | 1             | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display                                                                             | display          | wireframe     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable                                                                          | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                       |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                           |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                        |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| matrix         | matrix           | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Shadows Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| cast shadows   | cast_shadows     | disabled      | When enabled, the light casts shadows as defined by the <b>Shadow</b> controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| shadow mode    | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender.</li> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                   |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | occluders. This option is only relevant if you are using ScanlineRender to render your shadows.                                                                                                                                                                                                                                            |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                |
| scene epsilon | scene_epsilon    | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>         |
| samples       | samples          | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| sample width  | sample_width     | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is only relevant if your shadows are generated using raytracing.</p>                                                                     |
| bias          | depthmap_bias    | 0.01          | Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface.                                                                                                                                                                |

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                     |               | <p>Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                |
| slope bias         | depthmap_slope_bias | 0.01          | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| clipping threshold | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered transparent if their alpha is below the value set here.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| jitter scale       | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p>                                                                                                                                                                                                                        |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b> .                                                                                                                                                                                                                                                                                        |
| depthmap resolution | depthmap_width   | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| output mask         | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                       |
|                     |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled.                                                                                                                                                                                                                                                                                                                  |

# DisplaceGeo

With the DisplaceGeo node, you can modify the shape of your 3D geometry object based on an image. When using the node, each vertex is displaced along its normal with a value corresponding to the image pixel the vertex's uv attribute points to. The higher the pixel value, the greater the displacement.

See also [Displacement](#).



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to modify. This can be a Card node, for example. If you want to modify several objects together, you can also connect a MergeGeo node here. |
|                 | displace        | The image you want to use to modify the 3D geometry object.                                                                                                                 |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DisplaceGeo Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| display         | display          | unchanged     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable      | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| render          | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels     | channels         | rgb           | <p>The <b>displace</b> input's channels to use for the displacement value.</p> <p>If you set this to something other than <b>all</b> or <b>none</b>, you can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| source       | source           | luminance     | <p>The source channel you want DisplaceGeo to get a displacement map from. For example, if you selected rgb or rgba from the <b>channels</b> dropdown menu, you can use the red, green, or blue channel, or the pixel luminance as the source.</p> <ul style="list-style-type: none"> <li>• <b>luminance</b> - create a displacement map from luminance values.</li> <li>• <b>red</b> - create a displacement map from red color values.</li> <li>• <b>green</b> - create a displacement map from green color values.</li> <li>• <b>blue</b> - create a displacement map from blue color values.</li> <li>• <b>alpha</b> - create a displacement map from the alpha channel values.</li> <li>• <b>rgb absolute</b> - move your geometry object's vertices to the values in rgb.</li> <li>• <b>rgb relative</b> - move your geometry object's vertices on the x, y and z axes by the amounts in rgb.</li> </ul> |
| scale        | scale            | 0.1           | Increase or decrease the scale of the displacement. The higher the value, the bigger the displacement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| weight       | weight           | 1, 1, 1       | To give x, y, and z different weightings, enter new weights the <b>weight</b> fields. By default, each weighting is set to 1. If you don't want to make changes to a value, set its weight to 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| offset       | offset           | 0, 0, 0       | To offset x, y, and z values from the center of the geometry object, enter the value by which you want to offset them in the <b>offset</b> fields. For example, if you enter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | 0.5 in the <b>offset y</b> field, 0.5 is added to the y value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| filter size  | filter_size      | 5             | Change the size of the filtering applied to the image before the displacement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| filter       | filter           | Parzen        | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| attrib name  | uv_attrib_name   | uv            | Change the name of the attribute that's used as the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                |
|---------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | vertex's UV coordinates to find the image pixel. Normals are stored as a named attribute of a piece of geometry. <ul style="list-style-type: none"> <li>• <b>Cf</b> - surface color</li> <li>• <b>N</b> - normal</li> <li>• <b>PW</b> - world-space point</li> <li>• <b>uv</b> - texture coordinates</li> <li>• <b>vel</b> - point velocity.</li> </ul> |
| recalculate normals | recalc_normals   | enabled       | After the displacement, check this to recalculate the normals, which usually aren't correct after the vertices have been moved.                                                                                                                                                                                                                         |

# Displacement

Like the [DisplaceGeo](#) node, the Displacement shader node also performs displacement mapping, and at first glance the nodes seem very similar. However, the approach they have on performing displacement mapping is different.

Displacement mapping is a technique for adding geometric detail to object surfaces as you render them. Unlike the DisplaceGeo node, the Displacement node does this on the fly, only displacing those parts of the geometry that are visible at any given moment. Displacement considers the point of view of camera to determine which parts of the displacement need rendering, thus saving render time. It's also possible to optimize the level of tessellation to be the level that you need for an object at a certain distance.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                            |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Input           | normal          | An optional map for calculating the normals (an RGB image where each pixel corresponds to the X, Y, and Z coordinates of a surface) |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | normal).                                                                                                                                                                                                                                                                              |
|                 | displacement    | The image to create the displacement from.                                                                                                                                                                                                                                            |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Displacement Tab     |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| displacement channel | displacement_channel | luminance     | Choose the channel from the <b>displacement</b> input that you want to use as the displacement map: <ul style="list-style-type: none"> <li>• <b>red</b> - use the red channel.</li> <li>• <b>green</b> - use the green channel.</li> <li>• <b>blue</b> - use the blue channel.</li> <li>• <b>alpha</b> - use the alpha channel.</li> <li>• <b>luminance</b> - use the luminance.</li> <li>• <b>average</b> - use the average of the red, green, and blue channels.</li> </ul> |
| normal expansion     | normal_expansion     | none          | If you're using the <b>normals</b> input, uncheck the <b>build normals</b> box and choose how you want the normals to be calculated: <ul style="list-style-type: none"> <li>• <b>none</b> - to use the normals as they are (XYZ).</li> <li>• <b>XY</b> - to multiply the normals in the x and y dimensions (2*XY-1).</li> <li>• <b>XYZ</b> - to multiply the normals in the x, y, and z dimensions (2*XYZ-1).</li> </ul>                                                      |
| scale                | scale                | 0.1           | An overall multiplier that scales the displacement at each vertex.                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filter size   | filter_size      | 5             | The size of the filter to use when sampling the input image.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| filter        | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| build normals | build_normals    | enabled       | <p>Check this to automatically calculate the normals after the displacement.</p> <p>Uncheck this to have the normals calculated from the <b>normals</b> input according to the <b>normals expansion</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)      | Knob (Scripting)              | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|-------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                               |               | control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Tessellation Tab  |                               |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| max subdivision   | displacement_max_tessellation | 4             | Sets the number of times that the polygon subdivision is applied.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| mode              | displacement_mode             | screen        | <p>Select the polygon subdivision mode:</p> <ul style="list-style-type: none"> <li>• <b>uniform</b> - uniform polygon tessellation.</li> <li>• <b>screen</b> - evaluates dependent tessellation and ensures that no new triangles are generated once a certain screen size is reached.</li> <li>• <b>adaptive</b> - tessellate according to the displaced geometry complexity.</li> </ul>                                                                                         |
| pixel edge length | displacement_edge_length      | 20            | <p>Sets the length, in pixels, of the subdivision polygon edges.</p> <p>No polygons are generated beyond this threshold.</p>                                                                                                                                                                                                                                                                                                                                                      |
| edge threshold    | displacement_edge_threshold   | 0.01          | <p>Sets the edge threshold controlling subdivision. Edges larger than this get subdivided automatically, edges smaller than this get subdivided based on the normal threshold and the displace threshold. The smaller the threshold, the higher the amount of tessellation.</p> <div>  <b>Note:</b> The displacement <b>mode</b> must be set to <b>adaptive</b> to enable this control. </div> |
| normal threshold  | displacement_normal_threshold | 0.9           | <p>Sets the normal threshold when detecting changes in the normal orientation of the displaced samples. A value of 0.0 indicates normals with the same orientation. A value of 90.0 indicates orthogonal normals. The smaller threshold, the higher the amount of tessellation.</p>                                                                                                                                                                                               |

| Control (UI)       | Knob (Scripting)                | Default Value | Function                                                                                                                                                                                                                                                                                                                                               |
|--------------------|---------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                 |               |  <b>Note:</b> The displacement <b>mode</b> must be set to <b>adaptive</b> to enable this control.                                                                                                                                                                     |
| displace threshold | displacement_displace_threshold | 0.01          | <p>Sets the displace threshold when detecting changes in the height of the displaced samples. The smaller the threshold, the higher the amount of tessellation.</p>  <b>Note:</b> The displacement <b>mode</b> must be set to <b>adaptive</b> to enable this control. |



# EditGeo

The EditGeo node lets you modify geometry, including point cloud meshes, by selecting vertices and manipulating them in the 3D Viewer. EditGeo also includes a **Transform** tab to translate, rotate, and scale 3D objects.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to edit. If you want to edit several objects together, you can also connect a <a href="#">MergeGeo</a> node here. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EditGeo Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| display      | display          | unchanged     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| selectable                                                                          | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| render                                                                              | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| axis alignment                                                                      | axis_align       | object        | <p>Sets how the current selection's axis is aligned in the Viewer:</p> <ul style="list-style-type: none"> <li>• <b>object</b> - the position of the xyz axis is determined by the average position of all vertices in the selection. The orientation of the axis is the same as the object's orientation.</li> <li>• <b>average normal</b> - the position of the xyz axis is determined by the average position of all vertices in the selection. The orientation of the axis is aligned to the average of the current selection's normals.</li> </ul>                                        |
|  | set_key          | N/A           | Click to set a keyframe for the position of the currently selected vertices at the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|  | remove_key       | N/A           | Click to remove a keyframe for the position of the currently selected vertices at the current frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| reset geometry                                                                      | reset            | N/A           | Click to reset the vertices of the selected geometry to their original positions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Transform Tab                                                                       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file.</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | This is a useful method of sharing setups between artists.                                                                                                                                                                                                                                                                                                                                                                                                                           |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                     |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                   |
| translate                                                                         | translate        | 0,0,0         | Lets you translate the 3D object along the x, y, and z axes. you can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                |
| rotate                                                                            | rotate           | 0,0,0         | Lets you rotate the 3D object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                               |
| scale                                                                             | scale            | 1,1,1         | Lets you scale the 3D object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the 3D object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| skew                                                                              | skew             | 0,0,0         | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pivot                                                                             | pivot            | 0,0,0         | When you make changes to the 3D object's position, scaling, skewing, and rotation, these occur from the                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                           |
| specify matrix | useMatrix        | disabled      | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                               |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                     |

# Emission

The Emission node simulates lamps or other sources that emit light.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | map             | The image used to modulate the emission properties of the material.                                                                                                                                                                                                                   |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emission Tab |                  |               |                                                                                                                                                                                                                                                                                                   |
| channels     | channels         | rgba          | The effect is only applied to these channels.<br><br>You can use the checkboxes on the right to select individual channels.                                                                                                                                                                       |
| emission     | emission         | 0             | The color of the light the material emits. Note that when you have an image connected to the unnamed input of the node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the emission value does not have any effect in the 3D Viewer. |

## Environment

Environment lights illuminates objects using an image of light from a real-world environment. This image-based lighting is generated using High Dynamic Range (HDR) images.

To use environment light, you first need to shoot a real life environment as an HDR image. Using the SphericalTransform node, you then convert this image into a spherical mapped image. The sphere is used to surround the 3D objects, so that the mapped image color illuminates them.

Environment light only works with shiny object materials that can reflect the mapped image. It results in a very realistic lighting that makes it easier to integrate the objects into the environment.

See also [Light](#), [Spot](#), [Point](#), [Direct](#), and [Relight](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                   |
|-----------------|-----------------|------------------------------------------------------------|
| Input           | map             | The transformed HDR image to create the environment light. |
|                 | unnamed         | An Axis, a Camera, or another Light node.                  |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| color           | color            | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| intensity       | intensity        | 1             | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| filter          | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| mirror image | mirror           | enabled       | Mirror the HDR image attached to the <b>map</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| blur size    | blur_size        | 1             | Sets the blur size of the HDR image attached to the <b>map</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| display      | display          | wireframe     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> </ul>                                                    |
| selectable   | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| skew           | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                             |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                   |
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| matrix         | matrix           | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                                                                  |

# FillMat

The FillMat node lets you replace selected material channels with a constant color. Typically, you would use this node to make one object hold out the others, similar to using a black Constant node as the input texture. However, the advantage of using the FillMat node is that you can easily apply it to the alpha channel in addition to the rgb channels and it doesn't break the shading sequence, so you can insert it after other material nodes in your node tree.

## Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | unnamed         | The 2D image you're using for the surface texture. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------|
| FillMat Tab  |                  |               |                                                                                                                             |
| channels     | channels         | rgba          | The effect is only applied to these channels.<br><br>You can use the checkboxes on the right to select individual channels. |
| color        | color            | 0             | Adjusts the color used as the constant to replace the material.                                                             |

# GeoSelect

The GeoSelect node allows you to select individual vertices on a 3D geometry object and save and restore your selections.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                    |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to select vertices on, for example, a Sphere or a Cube node. If you want to manipulate several objects together, you can also connect a MergeGeo node here. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GeoSelect Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| display        | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable     | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| render         | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| save selection | save_selection   | N/A           | Saves your selection into the GeoSelect node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                       |
|-------------------|-------------------|---------------|--------------------------------|
| restore selection | restore_selection | N/A           | Restores last saved selection. |

# Light

You can use the Light node to add a direct, point, or spot light into your script rather than using specific predefined light nodes. The **light type** dropdown defines which light is created and enables or disables the relevant controls in the properties panel. The node can also import lights from **.fbx** files using the **File** tab.

See also [Spot](#), [Point](#), [Direct](#), [Environment](#), and [Relight](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | axis            | <p>An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding controls on the TransformGeo node.</p> <p>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.</p> |
|                 | look            | <p>An optional input where you can connect a Camera, Light, or Axis that the Light is automatically rotated to point toward. The Light is automatically rotated to point towards the connected input whenever the <b>look</b> input is moved.</p>                                                                                                                           |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|---------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Light Tab           |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| read from file      | read_from_file      | disabled      | When disabled, the light is configured using the controls on the <b>Light</b> tab. Enable <b>read from file</b> if you want to read in light information from an .fbx file using the <b>File</b> tab.                                                                                                                                                                                                                                                                                     |
| light type          | light_type          | point         | Sets the light type to <b>point</b> , <b>directional</b> , or <b>spot</b> and disables irrelevant controls.                                                                                                                                                                                                                                                                                                                                                                               |
| color               | color               | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| intensity           | intensity           | 1             | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| cone angle          | cone_angle          | 40            | <p>Sets the spot light cone angle adjusting the spread of the light. Valid angles are from 0 to 180 degrees.</p> <div>  <b>Note:</b> This control is only enabled for <b>spot</b> lights. </div>                                                                                                                                                                                                         |
| cone penumbra angle | cone_penumbra_angle | 0             | <p>Controls spot light softness along the edge of the area of illumination. A negative value fades inward from the circle's edge and vice versa. The cone falloff should be set to zero or a low amount in order to see the softness.</p> <div>  <b>Note:</b> This control is only enabled for <b>spot</b> lights and does not affect the Viewer. Results are only visible on rendered objects. </div> |
| cone falloff        | cone_falloff        | 0             | <p>Sets how much the spot light diminishes from the center of the circular region out to the edge. The higher the value, the more focused the light. The falloff is independent of the falloff type</p> <div>  <b>Note:</b> This control is only enabled for <b>spot</b> lights and is not affected by <b>falloff type</b>. </div>                                                                     |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| falloff type                                                                        | falloff_type     | No falloff    | <p>Sets the amount of light the object gets from the light source, based on the distance between the light source and the object.</p> <ul style="list-style-type: none"> <li>• <b>No falloff</b> - light does not diminish with distance.</li> <li>• <b>Linear</b> - diminish the light at a fixed rate as it travels from the object.</li> <li>• <b>Quadratic</b> and <b>Cubic</b> - diminish the light at an exponential rate.</li> </ul> <div>  <b>Note:</b> This control is only enabled for <b>point</b> and <b>spot</b> lights. </div>                                                                      |
| display                                                                             | display          | wireframe     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable                                                                          | selectable       | enabled       | <p>When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given</li> </ul>                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                               |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                     |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                   |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                  |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pivot                                                                             | pivot            | 0, 0, 0       | When you make changes to a 3D object's position,                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                            |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                  |
| World Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| matrix         | matrix           | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                 |
| Shadows Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| cast shadows   | cast_shadows     | disabled      | When enabled, the light casts shadow as defined by the <b>Shadow</b> controls. If using a ScanlineRender node, this only applies if the <b>light type</b> control was set to <b>directional</b> or <b>spot</b> . Casting shadows from a <b>point</b> light type is not supported in the ScanlineRender node.                                                                                                                                                           |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| shadow mode   | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender.</li> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| scene epsilon | scene_epsilon    | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| samples       | samples          | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| sample width  | sample_width     | 1             | Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                     |               | <p>a shadow. The higher the value, the larger the soft area.</p> <p>This control is only relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| bias               | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                    |
| slope bias         | depthmap_slope_bias | 0.01          | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| clipping threshold | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered transparent if their alpha is below the value set here.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| jitter scale       | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)                                                                    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                 |                  |               | <p>shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                             |
| depthmap resolution                                                             | depthmap_width   | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| output mask                                                                     | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                       |
|                                                                                 |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled.                                                                                                                                                                                                                                                                                                                  |
| File Tab (Controls on this tab are only active when read from file is enabled.) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| read from file                                                                  | read_from_file   | disabled      | When disabled, the light is configured using the controls on the <b>Light</b> tab. Enable <b>read from file</b> if you want to read in light information from an .fbx file using the <b>File</b> tab.                                                                                                                                                                                                                                          |
| file                                                                            | file             | N/A           | Sets the file path for the .fbx file from which you intend to import axis information.                                                                                                                                                                                                                                                                                                                                                         |
| reload                                                                          | reload           | N/A           | Click to reload the axis information from the specified                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| USD Options          | scene_graph      | N/A           | <p>When the <b>file</b> path is pointing to a valid <b>.usd</b> file, the <b>USD Options</b> are displayed.</p> <p>The <b>USD Options</b> show a scenegraph containing a list of the item names and their paths inside the <b>.usd</b> file.</p> <p>Click an item to select it and load it into the scene. The selected item can be identified in the <b>Load</b> column.</p> <p>Items in the <b>.usd</b> file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene.</p> <div>  <b>Note:</b> For more information about importing Lights from a <b>.usd</b> file, see <a href="#">Importing USD Items</a>. </div> |
| animation stack name | fbx_take_name    | N/A           | When the <b>file</b> control is pointing to a valid <b>.fbx</b> file, select the required <b>take name</b> from the dropdown menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| node name            | fbx_node_name    | N/A           | When the <b>file</b> control is pointing to a valid <b>.fbx</b> file, select the required <b>node name</b> from the dropdown menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| frame rate           | frame_rate       | 24            | When <b>use frame rate</b> is enabled, enter the required frame rate to use instead of the rate specified in the input file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| use frame rate       | use_frame_rate   | disabled      | When enabled, the frame rate from the input file is ignored and the specified <b>frame rate</b> is used instead.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| intensity scale      | intensity_scale  | 1             | Scales the intensity of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Look Tab             |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| look axis            | look_axis        | -Z            | The axis around which the Light is rotated to face the <b>look</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| rotate X             | look_rotate_x    | enabled       | Determines whether the rotation occurs around the X axis. Note that for the rotation to truly "look at" the <b>look</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)    | Knob (Scripting)     | Default Value | Function                                                                                                                                                                   |
|-----------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                      |               | input, all three of these options must be activated.                                                                                                                       |
| rotate Y        | look_rotate_y        | enabled       | Determines whether the rotation occurs around the Y axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options. |
| rotate Z        | look_rotate_z        | enabled       | Determines whether the rotation occurs around the Z axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options. |
| look strength   | look_strength        | 1             | Determines to what extent the Light rotates to the new orientation. The smaller the value, the less the object is rotated. Setting the value to 0 produces no rotation.    |
| use quaternions | look_use_quaternions | disabled      | Uses an alternate scheme to calculate the <b>look</b> rotation. This option may be useful to smooth out erratic rotations along the look axis.                             |

# LogGeo

Move the XYZ of the points by raising the values to a power. This can be useful if you need to visualize rgb values as a point cloud by treating the rgb values as xyz positions.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to modify. This can be a Card node, for example. If you want to modify several objects together, you can also connect a MergeGeo node here. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LogGeo Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| display      | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable   | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| render       | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| log          | log              | 10, 10, 10    | Enter the power you want to raise the respective vertex values to. For example, if you want to raise the vertex z values to the power of 20, enter 20 in the z field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| swap         | swap             | disabled      | <p>When <b>swap</b> is disabled, the vertex values are calculated as follows:</p> $v_x = v_x^{\log_x}$ $v_y = v_y^{\log_y}$ $v_z = v_z^{\log_z}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>In the above, <math>v_x</math> refers to the x coordinate of vertex v and <math>\log_x</math> refers to the x value entered into the <b>log</b> field. When <b>swap</b> is checked, the values are calculated like this:</p> $v_x = \log_x^v - 1.0$ $v_y = \log_y^v - 1.0$ $v_z = \log_z^v - 1.0$ |
| clamp black  | clamp_black      | disabled      | To clamp the negative x, y, and z values to 0.0, check clamp black. This prevents your calculated values from continuing to infinity. This option is only valid if you have checked <b>swap</b> .                                                                                                    |

# LookupGeo

The LookupGeo node lets you use lookup curves to modify the shape of your 3D geometry objects. It offers you direct global control over each of the vertex x, y, and z values respectively. You can, for example, only modify all the y values without touching the x and z values.

You change the different vertex values (x, y, or z) by modifying their associated 2D curves in lookup tables (LUTs). The x axis in the LUT represents the current vertex value, and the y axis the new vertex value. By default, the curve is a diagonal line where all the points in the curve have the same value on the y axis (the new value) as they do on the x axis (the current value). Because both x and y values are the same, there is no change in the object's shape.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                           |
|-----------------|-----------------|--------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object whose shape you want to modify. This can be |

| Connection Type | Connection Name | Function                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------|
|                 |                 | a Card node, for example. If you want to modify several objects together, you can also connect a MergeGeo node here. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LookupGeo Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| display       | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable    | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| render        | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| LUT curves    | lut              | N/A           | <p>Selects the curve you want to modify. Choose <b>X</b>, <b>Y</b> or <b>Z</b>. For example, you'd select Z to only modify the vertex z values.</p> <p>Adjust the curve as necessary by dragging. To insert points on the curve, <b>Ctrl/Cmd+Alt</b>+click on the curve.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| reset         | N/A              | N/A           | Resets the selected curve(s) to their initial values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



# MergeGeo

Merges your 3D geometry objects together into one big geometry so you can process all of them at the same time.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | numbered inputs | Any 3D geometry objects you want to merge together. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MergeGeo Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| display      | display          | unchanged     | <p>Adjusts the display characteristics of the 3D objects. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable   | selectable       | enabled       | <p>When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                         |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| render         | render_mode      | unchanged     | Sets how the merged objects will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                               |
| shadow         | shadow_override  | unchanged     | Determines whether merged geometry nodes remain <b>unchanged</b> , or are adjusted to <b>override inputs</b> . If the latter option is chosen, you can set shadow options for the newly merged nodes.            |
| cast shadow    | cast_shadow      | disabled      | If the shadow operation is set to <b>override inputs</b> , <b>cast shadow</b> enables the geometry to cast shadows on other objects.                                                                             |
| receive shadow | receive_shadow   | disabled      | If the shadows operation is set to <b>override inputs</b> , <b>receive shadow</b> enables the geometry to have shadows cast on it by other objects, provided a materials shader has been attached to the object. |

# MergeMat

Combine two shader nodes together, using compositing algorithms like **none**, **replace**, **over**, and **stencil**. The MergeMat node is particularly useful for combining multiple Project3D nodes, allowing you to composite 2D images projected onto the 3D geometry atop each other.

## Inputs and Controls

| Connection Type | Connection Name | Function                                      |
|-----------------|-----------------|-----------------------------------------------|
| Input           | A               | The the foreground material element to merge. |
|                 | B               | The the background material element to merge. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MergeMat Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| channels     | channels         | rgba          | <p>The effect is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| operation    | operation        | over          | <p>Selects how you want to composite the results of the two shader nodes together:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - only use input B in the composite.</li> <li>• <b>replace</b> - only use input A in the composite.</li> <li>• <b>over</b> - composite input A over input B using a mask.</li> <li>• <b>stencil</b> - use input B outside the mask area.</li> <li>• <b>mask</b> - use input B inside the mask area.</li> <li>• <b>plus</b> - add input B to input A.</li> <li>• <b>max</b> - use input A if it is greater than input B, otherwise use input B.</li> <li>• <b>min</b> - use input A if it is less than input B, otherwise use input B.</li> </ul> |

# ModelBuilder

The ModelBuilder node (NukeX and Nuke Studio only) provides an easy way to create 3D models for 2D shots. You can build a model by creating shapes and then editing them, and align models over your 2D footage by dragging vertices to their corresponding 2D location.

To be able to align models, ModelBuilder needs a tracked camera and an input image for visual reference. You can also use other 3D geometry and point clouds as a reference if you already have these for your scene.

If you don't connect a camera, image sequence, or reference geometry, you can still create and edit 3D models, you just can't do anything in Align mode.

Creating and editing models using ModelBuilder requires a NukeX license, but the resulting geometry can also be used in Nuke.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | geo             | <p>3D geometry to use as a reference when positioning new shapes.</p> <p>For example, you can use the <a href="#">PointCloudGenerator</a> node to create a 3D point cloud for your shot, and connect that to this input. When creating new shapes, you can then select vertices on the point cloud to automatically align the shapes with the point cloud. This gives you an approximate initial position for your shapes.</p> |
|                 | cam             | The camera track of the scene in which you intend to use the ModelBuilder.                                                                                                                                                                                                                                                                                                                                                     |
|                 | src             | The source footage from which the camera information was obtained.                                                                                                                                                                                                                                                                                                                                                             |
|                 | tex             | An optional 2D texture that you can display as a background in the UV preview window and on the model in the 3D Viewer.                                                                                                                                                                                                                                                                                                        |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ModelBuilder Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| display          | display          | wireframe     | <p>Adjusts the display characteristics of the 3D shapes. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D shape.</li> <li>• <b>wireframe</b> - displays only the outlines of the shape's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the shape's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| selectable     | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                    |
| render         | render_mode      | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                             |
| cast shadow    | cast_shadow      | enabled       | When enabled, the shape(s) can cast shadows.                                                                                                                                                                                                                                                                                                                           |
| receive shadow | receive_shadow   | enabled       | When enabled, and the geometry has a material shader attached to it, the shape(s) can receive shadows.                                                                                                                                                                                                                                                                 |
| Scene          | N/A              | N/A           | Shows the hierarchy of shapes and groups of shapes in the scene.<br><br>To rename shapes or groups, click on them and enter a new name.<br><br>To toggle the visibility of shapes or groups, click  . Note that when an item is hidden, it doesn't appear in the Viewer or renders. |
| +              | sceneAdd         | N/A           | Adds a new group to the scene.<br><br>You can use groups to organize and set the visibility for shapes in the scene.                                                                                                                                                                                                                                                   |
| -              | sceneDelete      | N/A           | Deletes the selected shapes and groups from the scene.                                                                                                                                                                                                                                                                                                                 |
| Duplicate      | sceneCopy        | N/A           | Duplicates the selected shapes and groups in the scene.                                                                                                                                                                                                                                                                                                                |
| Distance       | shapeDistance    | 10            | Sets the default distance at which shapes are created. New shapes are positioned at this distance from the camera.<br><br>There are no specific units for the <b>Distance</b> value. Low values position the shape close to                                                                                                                                            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | the camera, and higher values mean further away.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Textures     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Projected    | textureType      | current frame | <p>Sets the texture method to use:</p> <ul style="list-style-type: none"> <li>• <b>current frame</b> - Project the current frame onto the shape.</li> <li>• <b>locked frame</b> - Project the frame specified in the field on the right onto the shape. This can help you line up the shape against your source footage.</li> <li>• <b>frame difference</b> - Subtract the frame specified in the field on the right from the current frame and project the resulting frame onto the shape. This can help you line up the shape against your source footage.</li> </ul> <div>  <b>Note:</b> This control only has an effect when <b>display</b> is set to <b>textured</b> or <b>textured+wireframe</b>. </div> |
|              | textureFrame     | N/A           | <p>When <b>Projected</b> is set to <b>locked frame</b>, ModelBuilder always projects the texture from this frame onto the model.</p> <p>When <b>Projected</b> is set to <b>frame difference</b>, ModelBuilder subtracts this value from the current frame and projects the resulting frame on to the model.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Preview      | previewTexture   | tex input     | <p>Sets whether to display the image connected to the <b>tex</b> input in the UV preview window and on the 3D model:</p> <ul style="list-style-type: none"> <li>• <b>off</b> - Do not display the image in the UV preview or on the 3D model.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |                   | <ul style="list-style-type: none"> <li>• <b>tex input</b> - Display the image as a background in the UV preview and set it as the texture for the currently selected object in the 3D Viewer. This allows you to line up your UVs over features in the <b>tex</b> image and see how well the UVs work on the actual model.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Export       |                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| [bake menu]  | bakeMenu         | Selected geometry | <p>Sets what ModelBuilder creates when you click the <b>Bake</b> button:</p> <ul style="list-style-type: none"> <li>• <b>Selected geometry</b> - ModelBuilder creates a geometry node for the selected items in the scene. You can use this to bake out parts of the scene to set up projections by baking <b>Projection</b>.</li> <li>• <b>Projection</b> - ModelBuilder creates a projection at the current texture frame. This creates a <a href="#">Project3D</a> node with a <a href="#">FrameHold</a> node set to lock the input image and camera to the texture frame. You can then use the <a href="#">ApplyMaterial</a> node to apply the projection to geometry created by baking <b>Selected geometry</b>.</li> </ul> <div>  <p><b>Note:</b> The options in this menu are implemented in Python, and you can also use Python to add your own entries to the menu. For more information, see Nuke's <a href="#">online help</a>.</p> </div> |
| Bake         | bake             | N/A               | <p>Bakes out a feature of your model. You can choose the feature using the bake menu.</p> <p>This allows you to separate out parts of the scene for easier processing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Show Source  | srcDisplay       | enabled           | When enabled, the <b>src</b> image is displayed in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Image            |                  |               | <p>3D Viewer whenever the Viewer is locked to the input camera.</p> <p>When disabled, the <b>src</b> image is not displayed in the 3D Viewer.</p>                                                                                                                                                                                                                                                                                                |
| Pass Through Geo | passThroughGeo   | enabled       | <p>When enabled, the geometry from the <b>geo</b> input appears both in the Viewer and renders. This can be useful when you want to use the <b>geo</b> input as a reference for building your model. For example, when creating new shapes, you can select points or vertices on the geometry to automatically align the shapes with the geometry.</p> <p>When disabled, ModelBuilder doesn't output the geometry from the <b>geo</b> input.</p> |

#### Shape Defaults Tab

##### Point

|        |             |     |                                                                                                                                                                                                                                                                 |
|--------|-------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Create | createPoint | N/A | <p>Creates a new point in the scene. You can use points to define locators on different parts of the scene.</p> <p>This is the same as selecting <b>Point</b> from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.</p> |
|--------|-------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

##### Card

|         |             |     |                                                                                                                                                                                        |
|---------|-------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Create  | createCard  | N/A | <p>Creates a new card in the scene.</p> <p>This is the same as selecting <b>Card</b> from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.</p> |
| Rows    | newCardRows | 4   | Sets the default number of rows for new cards.                                                                                                                                         |
| Columns | newCardCols | 4   | Sets the default number of columns for new cards.                                                                                                                                      |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                            |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cube         |                  |               |                                                                                                                                                                                     |
| Create       | createCube       | N/A           | Creates a new cube in the scene.<br><br>This is the same as selecting <b>Cube</b> from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.     |
| Rows         | newCubeRows      | 1             | Sets the default number of rows for new cubes.                                                                                                                                      |
| Columns      | newCubeCols      | 1             | Sets the default number of columns for new cubes.                                                                                                                                   |
| Slices       | newCubeSlices    | 1             | Sets the default number of slices for new cubes.                                                                                                                                    |
| Sphere       |                  |               |                                                                                                                                                                                     |
| Create       | createSphere     | N/A           | Creates a new sphere in the scene.<br><br>This is the same as selecting <b>Sphere</b> from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer. |
| Rows         | newSphereRows    | 20            | Sets the default number of rows for new spheres.                                                                                                                                    |
| Columns      | newSphereCols    | 20            | Sets the default number of columns for new spheres.                                                                                                                                 |
| Cone         |                  |               |                                                                                                                                                                                     |
| Create       | createCone       | N/A           | Creates a new cone in the scene.<br><br>This is the same as selecting <b>Cone</b> from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.     |
| Slices       | newConeSlices    | 20            | Sets the default number of slices for new cones.                                                                                                                                    |
| Cylinder     |                  |               |                                                                                                                                                                                     |
| Create       | createCylinder   | N/A           | Creates a new cylinder in the scene.<br><br>This is the same as selecting <b>Cylinder</b> from the shape creation menu in the ModelBuilder                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                              |
|--------------|------------------|---------------|-------------------------------------------------------|
|              |                  |               | toolbar on the left hand side of the Viewer.          |
| Rows         | newCylinderRows  | 2             | Sets the default number of rows for new cylinders.    |
| Columns      | newCylinderCols  | 20            | Sets the default number of columns for new cylinders. |

# ModifyRIB

The ModifyRIB node (NukeX only) lets you insert RIB (RenderMan Interface Bytestream) statements into your script to modify a RenderMan bytestream before it's passed to the PrmanRender node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The object or scene that you want to modify. Depending on the type of operation you choose, you may place the ModifyRIB node before or after the Scene node in your script. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ModifyRIB Tab |                  |               |                                                                                                                                                                                                                                                                                                                                        |
| operation     | operation        | object        | Sets how RIB statements are modified in the RIB stream. You can choose from the following operations: <ul style="list-style-type: none"> <li>• <b>object</b> - RIB statements are inserted before the statements for the object connected to the input.</li> <li>• <b>shader</b> - RIB statements replace all of the shader</li> </ul> |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <p>definitions for the object connected to the input.</p> <ul style="list-style-type: none"> <li>• <b>replace</b> - RIB statements completely replace the object connected to the input. A transform can then be applied to the RIB statements. Setting the operation to <b>replace</b> enables the transform knobs.</li> <li>• <b>world</b> - RIB statements are inserted at the start of the world in the RIB stream.</li> </ul>                                                                                                                                                                                                                       |
| archive                                                                             | ribArchive       | N/A           | Specifies the RIB archive (from Nuke or another 3D application) to add to the scene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| use                                                                                 | useRibArchive    | disabled      | When, enabled the RIB archive is added to the scene, otherwise the RIB statements are added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| reload                                                                              | reload           | N/A           | Click to reloads the specified RIB archive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| statements                                                                          | ribStatements    | N/A           | <p>The RIB statements to add to the scene.</p> <div>  <p><b>Note:</b> Malformed RIB statements (unclosed quotes, for example) can crash PrmanRender and in turn Nuke. For more information on RIB statements, please refer to the documentation provided with RenderMan.</p> </div>                                                                                                                                                                                                                                                                                   |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the input object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Snapto</b> - snap your 3D object to a vertex selection.</li> <li>• <b>Scaletto</b> - scale your 3D object to a vertex selection.</li> <li>• <b>Translateto</b> - translate your 3D object to a vertex selection.</li> </ul>                                                                                                                                                                                                                                           |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                  |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                |
| translate                                                                         | translate        | 0,0,0         | Lets you translate the 3D object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                             |
| rotate                                                                            | rotate           | 0,0,0         | Lets you rotate the 3D object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                            |
| scale                                                                             | scale            | 1,1,1         | Lets you scale the 3D object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the 3D object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| skew                                                                              | skew             | 0,0,0         | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| pivot                                                                             | pivot            | 0,0,0         | <p>When you make changes to the 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix                                                                      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| specify matrix                                                                    | useMatrix        | disabled      | Enable this control to specify matrix values for the object                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                       |
| matrix       | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# Normals

The Normals node lets you manipulate the normals of your 3D geometry object. Object normals are vectors that are perpendicular to the surface. They are used in lighting calculations to determine how the light should bounce off a surface at any particular point. By manipulating them, you can control the diffuse and specular light contributions.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                    |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object whose normals you want to manipulate. If you want to manipulate several objects together, you can also connect a MergeGeo node here. |
|                 | lookat          | Any Camera, Axis, or light node. If you set <b>action</b> to <b>lookat</b> , the node points all normals towards this input. (optional)                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normals Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| display      | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - doesn't display geometry outlines.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable   | selectable       | enabled       | <p>When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| render       | render_mode      | unchanged     | <p>Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| action       | action           | unchanged     | <p>Sets the mode for manipulating normals:</p> <ul style="list-style-type: none"> <li>• <b>unchanged</b> - makes no changes to the object's normals.</li> <li>• <b>set</b> - assigns the normals' values to the normal <b>x</b>, <b>y</b>, and <b>z</b> fields.</li> <li>• <b>build</b> - rebuilds each normal based on the surrounding vertices. Adjust the <b>thresholdangle</b> slider to determine the break angle where two faces no longer constitute a smooth surface. An angle of 0 means all faces are flat, whereas 180 means all faces are smooth. A good average setting is 60.</li> <li>• <b>lookat</b> - points all normals at the object connected to</li> </ul>                                                                                                                                                   |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>the <b>lookat</b> input. The <b>normal</b> control's values are added to the lookat position.</p> <ul style="list-style-type: none"> <li>• <b>delete</b> - removes the named attribute from the object. For example, if you remove the N attribute, the object has no normals. See the <b>attribname</b> control below.</li> </ul>                                                                                                                                                                                                                                        |
| invert          | invert           | disabled      | Inverts the resulting normals. This works in all action modes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| normal          | normal           | N/A           | Constant x, y, and z values. These are used in the <b>set</b> and <b>lookataction</b> modes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| angle threshold | threshold        | 45            | If the angle between two faces is greater than this, break the normal. This only works with vertex normals and is only available if <b>build</b> is selected in the <b>action</b> dropdown. Broken normals create sharp edges when lit.                                                                                                                                                                                                                                                                                                                                      |
| attrib name     | N_attrib_name    | N             | <p>The name of the normal attribute to delete (this only works if you set <b>action</b> to <b>delete</b>). Normals are stored as a named attribute of a piece of geometry. By default the attribute name is "N". With this control, you can tell the node to perform the delete action on normals from another attribute instead.</p> <ul style="list-style-type: none"> <li>• <b>Cf</b> - surface color</li> <li>• <b>N</b> - normal</li> <li>• <b>PW</b> - world-space point</li> <li>• <b>uv</b> - texture coordinates</li> <li>• <b>vel</b> - point velocity.</li> </ul> |

# Phong

Uses the Phong shading algorithm to provide accurate shading and highlights. The Phong node has several map inputs you can use to mask the effect of the node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | mapsh           | An optional mask for varying the shininess value. Where the mask is black, the shininess is set to <b>min shininess</b> . Where the mask is white, the shininess is set to <b>max shininess</b> . Values in between (where the matte is gray) are attenuated accordingly.             |
|                 | mapS            | An optional mask for limiting the effect of the specular component. Any changes you make to <b>specular</b> are limited to the non-black areas of the mask.                                                                                                                           |
|                 | mapE            | An optional mask for limiting the effect of the emissive component. Any changes you make to <b>emission</b> are limited to the non-black areas of the mask.                                                                                                                           |
|                 | mapD            | An optional mask for limiting the effect of the diffuse component. Any changes you make to <b>diffuse</b> are limited to the non-black areas of the mask.                                                                                                                             |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                          |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phong Tab    |                  |               |                                                                                                                                                                                   |
| channels     | channels         | rgba          | The effect is only applied to these channels.<br><br>If you set this to something other than <b>none</b> , you can use the checkboxes on the right to select individual channels. |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| color         | color            | 1             | Adjusts the material color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| emission      | emission         | 0             | The color of the light the material emits. Note that when you have an image connected to the unnamed input of the node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the emission value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                            |
| diffuse       | diffuse          | 0.18          | The color of the material when illuminated. Note that when you have an image connected to the unnamed input of the node and adjust this value, you need to look at the rendered 2D image to see the effect of your changes. Changing the white value does not have any effect in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                              |
| specular      | specular         | 0.8           | Adjusts how bright the highlights on the material seem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| min shininess | min_shininess    | 10            | <p>The shininess value controls the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> <p>If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.</p> |
| max shininess | max_shininess    | 10            | <p>The shininess value controls the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the</p>                                                                                                                                                                                                                                                                                             |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                   |               | <p>shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> <p>If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.</p>                                                                                                                                                                                                                                                                           |
| shininess channel | shininess_channel | luminance     | <p>Select which channel from the <b>mapSh</b> input is used to map the black and white values to the <b>minshininess</b> and <b>maxshininess</b> controls. Choose:</p> <ul style="list-style-type: none"> <li>• <b>red</b> to use the red channel for the mapping,</li> <li>• <b>green</b> to use the green channel,</li> <li>• <b>blue</b> to use the blue channel,</li> <li>• <b>alpha</b> to use the alpha channel,</li> <li>• <b>luminance</b> to use the luminance, or</li> <li>• <b>averagergb</b> to use the average of the red, green, and blue channels.</li> </ul> |

# Point

A Point light is a point in 3D space that emits light in every direction. A real world example of a point light is a light bulb. You can use Point lights to simulate light bulbs, lamps, and candles, for example.

See also [Light](#), [Spot](#), [Direct](#), [Environment](#), and [Relight](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                  |
|-----------------|-----------------|-------------------------------------------|
| Input           | unnamed         | An Axis, a Camera, or another Light node. |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Point Tab                                                                           |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| color                                                                               | color            | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| intensity                                                                           | intensity        | 1             | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| falloff type                                                                        | falloff_type     | No falloff    | <p>Sets the amount of light the object gets from the light source, based on the distance between the light source and the object.</p> <ul style="list-style-type: none"> <li>• <b>No falloff</b> - light does not diminish with distance.</li> <li>• <b>Linear</b> - diminish the light at a fixed rate as it travels from the object.</li> <li>• <b>Quadratic</b> and <b>Cubic</b> - diminish the light at an exponential rate.</li> </ul>                                                                                                                                                                                                                                                        |
| display                                                                             | display          | wireframe     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable                                                                          | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given</li> </ul>                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                                                                               |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                     |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                   |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                  |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pivot                                                                             | pivot            | 0, 0, 0       | When you make changes to a 3D object's position,                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)                                                                                                    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                 |                  |               | <p>scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix                                                                                                    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| specify matrix                                                                                                  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                            |
| matrix                                                                                                          | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                  |
| World Matrix                                                                                                    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| matrix                                                                                                          | matrix           | N/A           | <p>Displays the world or absolute xyz transform of the node in world coordinates.</p> <div>  <b>Note:</b> Unlike the <b>Local matrix</b>, you can't adjust the <b>World matrix</b> manually. </div>                                                                                                                                                                                 |
| Projection Tab (Controls on this tab do not affect Viewer output. Projection only applies to rendered objects.) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| projection                                                                                                      | projection_mode  | perspective   | <p>Sets the projection type for the Point light on rendered objects:</p> <ul style="list-style-type: none"> <li>• <b>perspective</b> - objects in front of the light have the illusion of depth defined by the <b>focal length</b> and <b>h/vaperture</b>.</li> </ul>                                                                                                                                                                                                  |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                          |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"> <li>• <b>orthographic</b> - objects are viewed using a parallel projection.</li> <li>• <b>uv</b> - every object renders its UV space into the output format. Use this to cook out texture maps.</li> <li>• <b>spherical</b> - the entire 360° world is rendered as a spherical map.</li> </ul> |
| focal length     | focal            | 50            | Adjusts the light's level of magnification.                                                                                                                                                                                                                                                                                       |
| horiz aperture   | haperture        | 24.576        | Sets the horizontal aperture of the light.                                                                                                                                                                                                                                                                                        |
| vert aperture    | vaperture        | 18.672        | Sets the vertical aperture of the light.                                                                                                                                                                                                                                                                                          |
| near             | near             | 0.1           | Adjusts the position of the light's forward clipping plane. Objects in front of this plane are not rendered or displayed.                                                                                                                                                                                                         |
| far              | far              | 10000         | Adjusts the position of the light's rearward clipping plane. Objects behind this plane are not rendered or displayed.                                                                                                                                                                                                             |
| window translate | win_translate    | 0, 0          | Translates the light's output along the uv axes.                                                                                                                                                                                                                                                                                  |
| window scale     | win_scale        | 1, 1          | Scales the light's output along the uv axes.                                                                                                                                                                                                                                                                                      |
| window roll      | winroll          | 0             | Rotates the light's output around the z axis.                                                                                                                                                                                                                                                                                     |
| focal distance   | focal_point      | 2             | Controls the distance from the lens where the light focuses.                                                                                                                                                                                                                                                                      |
| fstop            | fstop            | 16            | Sets the f-stop value (relative aperture) of the light.                                                                                                                                                                                                                                                                           |
| Shadows Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                   |
| cast shadows     | cast_shadows     | disabled      | When enabled, the light casts shadow as defined by the <b>Shadow</b> controls. However, casting shadows from a Point light type is not currently supported in the ScanlineRender node.                                                                                                                                            |
| shadow mode      | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be</li> </ul>                                                                                                  |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <p>completely solid. This option can be used with both ScanlineRender and PrmanRender.</p> <ul style="list-style-type: none"> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| scene epsilon | scene_epsilon    | 0.001         | <p>An offset that moves the sampling point away from the geometry surface, towards the light that is casting the shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                                                                                                                                                                                                                    |
| samples       | samples          | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                            |
| sample width  | sample_width     | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is only relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bias               | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This control is only relevant when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                    |
| slope bias         | depthmap_slope_bias | 0.01          | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and increase <b>slope bias</b> instead.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| clipping threshold | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered transparent if their alpha is below the value set here.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| jitter scale       | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value</p>                                                                                                                                                                                                                                                                                                                                         |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | <p>for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                          |
| depthmap resolution | depthmap_width   | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| output mask         | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                       |
|                     |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled.                                                                                                                                                                                                                                                                                                                  |

# PointCloudGenerator

Using the PointCloudGenerator node (NukeX and Nuke Studio only) you can create a dense point cloud based on the information generated by [CameraTracker](#) and use the dense point cloud further to create 3D meshes of your 2D footage. Dense point clouds are a useful starting point for 3D modeling and positioning objects in a scene.



**Note:** The analysis must be performed in NukeX, but the result can be used in Nuke.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Camera          | The camera track of the scene from which you intend to generate the dense point cloud.                                                                                                                                                                                                                                                                                       |
|                 | Mask            | <p>An optional image to use as a mask. By default, the point cloud is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled mask. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |
|                 | Source          | The source footage from which the camera information was obtained.                                                                                                                                                                                                                                                                                                           |

| Control (UI)            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PointCloudGenerator Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| display                 | display          | solid         | <p>Adjusts the display characteristics of points. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the points.</li> <li>• <b>wireframe</b> - displays only the outlines of the points.</li> <li>• <b>solid</b> - displays all points with a solid color.</li> <li>• <b>solid+wireframe</b> - displays points as solid color and includes their vertices.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable              | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| render         | render_mode      | solid         | Sets how the points will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| cast shadow    | cast_shadow      | enabled       | When enabled, the object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| receive shadow | receive_shadow   | enabled       | When enabled, and a material shader is added to the object, the object can receive shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Principal View | principalView    | left          | <p>Sets the principal view where tracks are analyzed and the <b>Mask</b> input is applied. The secondary camera is calculated relative to this <b>Principal View</b> camera.</p> <p>This control is only displayed if you have set up more than one view in your <b>Project Settings</b> (typically, if you're working on a stereoscopic project).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Ignore Mask    | ignore           | None          | <p>Set the mask type to exclude areas of the sequence during generation:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - none of the footage is ignored.</li> <li>• <b>Source Alpha</b> - use the alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Source Inverted Alpha</b> - use the inverted alpha channel of the source clip to define which areas to ignore.</li> <li>• <b>Mask Luminance</b> - use the luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Inverted Luminance</b> - use the inverted luminance of the <b>Mask</b> input to define which areas to ignore.</li> <li>• <b>Mask Alpha</b> - use the <b>Mask</b> input alpha channel to define which areas to ignore.</li> <li>• <b>Mask Inverted Alpha</b> - use the inverted <b>Mask</b> input alpha channel to define which areas to ignore.</li> </ul> |
| Set Keyframes  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Analyze        | analyzeSequence  | N/A           | Click to automatically analyse the sequence and set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                               |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sequence            |                  |               | <p>the required keyframes to use when generating the point cloud.</p> <div>  <b>Note:</b> Keyframes are selected to provide a large enough camera baseline to triangulate points, but you can add and delete keyframes manually, if necessary. </div> |
| Keyframes           | keyframes        | 0             | Displays the frames used to track points in the input sequence. Both automatic and manual keyframes are shown.                                                                                                                                                                                                                         |
| Add                 | addKeyframe      | N/A           | Click to set a keyframe at the current frame.                                                                                                                                                                                                                                                                                          |
| Delete              | deleteKeyframe   | N/A           | Click to delete the keyframe at the current frame.                                                                                                                                                                                                                                                                                     |
| Frame Spacing       | frameSpacing     | 15            | Sets the interval between keyframes when you click <b>Add All</b> . For example, the default value creates a keyframe every 15th frame.                                                                                                                                                                                                |
| Add All             | addAllKeyframes  | N/A           | Click to set keyframes throughout the sequence at intervals specified by the <b>FrameSpacing</b> control. For example, for a sequence with 30 frames, the default spacing value creates 3 keyframes.                                                                                                                                   |
| Delete All          | deleteKeyframes  | N/A           | Click to delete all keyframes in the sequence.                                                                                                                                                                                                                                                                                         |
| Calculated Accuracy | accuracy         | 0             | <p>Displays the depth accuracy calculated at the current frame when using the automatic <b>SetKeyframes</b> method.</p> <p>The accuracy rating can help you to select frame ranges when generating a point cloud - higher accuracy frames produce cleaner point clouds.</p>                                                            |
| Dense Tracking      |                  |               |                                                                                                                                                                                                                                                                                                                                        |
| Point Separation    | pointSeparation  | 2             | Sets the separation value, in pixels, for points in the dense point cloud. Reduce the separation to create denser point clouds and vice-versa.                                                                                                                                                                                         |

| Control (UI)            | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------|-----------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Track Threshold         | matchThreshold        | 0.5           | Sets the correlation threshold at which point tracks are terminated. Use a higher threshold to increase the accuracy in matching points between keyframes.                                                                                                                                                                                                               |
| Track Points            | track                 | N/A           | <p>Click to display a frame range dialog to determine which frames are used to calculate the point cloud. Use the standard Nuke notation, for example, 1-19, 40-60, 65-100.</p> <p>Points can also be added to the point cloud in stages using different frame range selections. Use <b>CalculatedAccuracy</b> to determine the most accurate frames for generation.</p> |
| Clear Points            | clearPoints           | N/A           | Click to clear all tracked points.                                                                                                                                                                                                                                                                                                                                       |
| Post Filtering          |                       |               |                                                                                                                                                                                                                                                                                                                                                                          |
| Display rejected points | displayRejectedPoints | enabled       | <p>When enabled, points that fall outside the <b>Angle</b> and <b>DensityThresholds</b> are highlighted in the 3D Viewer.</p> <p>When disabled, all rejected points are removed from the Viewer.</p>                                                                                                                                                                     |
| Angle Threshold         | minTriAngle           | 1             | <p>Sets the threshold for the minimum angle to triangulate 3D points (in degrees). Points with a large triangulation angle are more accurate. Set a threshold of 0 to triangulate all points. Increase the threshold to retain the more accurate points.</p> <p>As a rule of thumb, anything below 5 degrees is likely to be incorrect.</p>                              |
| Density Threshold       | densityThreshold      | 0             | Sets the threshold for the minimum density for points. Set a threshold of 0 to output all points and increase the threshold to highlight isolated points.                                                                                                                                                                                                                |
| Delete Rejected Points  | deleteRejected        | N/A           | Click to permanently delete points that are rejected by the <b>Angle</b> and <b>DensityThresholds</b> .                                                                                                                                                                                                                                                                  |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                             |
|----------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                  |               |  <b>Tip:</b> To clean up the point cloud, try enabling <b>Output points per frame</b> and <b>Display rejected points</b> . You can then tune the <b>Filtering</b> thresholds and delete points at different frames. |
| Output                     |                  |               |                                                                                                                                                                                                                                                                                                      |
| Point Size                 | pointSize        | 2             | Sets the size, in pixels, of points displayed in the 3D Viewer.                                                                                                                                                                                                                                      |
| Output points per frame    | outputPerFrame   | disabled      | <p>When enabled, only the points generated at the current frame are displayed in the Viewer.</p> <p>When disabled, points from all tracked frames are displayed.</p>                                                                                                                                 |
| Groups Tab                 |                  |               |                                                                                                                                                                                                                                                                                                      |
| Display groups in overlay  | displayGroups    | enabled       | When enabled, group colors are displayed as an overlay in the 3D Viewer.                                                                                                                                                                                                                             |
| Output visible groups only | outputGroups     | disabled      | <p>When enabled, only points designated as part of a group on the <b>Groups</b> tab are displayed in the 3D Viewer.</p> <p>You can label the point cloud using <b>Groups</b> to help visualize different parts of the scene.</p>                                                                     |
| Create Group               | createGroup      | N/A           | Click to add the current vertex selections to a new group. You can also use the Viewer right-click menu to create, delete, and modify groups.                                                                                                                                                        |
| Delete Selected Group      | deleteGroup      | N/A           | <p>Click to delete all selected groups and deselect the group in the point cloud.</p> <p>To delete points use <b>Vertex selection</b> mode in the 3D Viewer and press the <b>delete</b> key.</p>                                                                                                     |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Groups                                                                                                                                                 |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                          |
| groups                                                                                                                                                 | groups            | None          | <p>Lists all groups in the point cloud and allows you to set the <b>name</b>, <b>color</b>, and <b>visibility</b> of each group.</p> <p>To create groups, enable <b>Vertexselection</b> mode in the 3D Viewer. You can then select points and use the right-click menu to create a new group or add the selected points to an existing group.</p>                                                        |
| Bake Selected Groups                                                                                                                                   | bakeGroups        | N/A           | Click to bake the selected groups to a separate, baked point cloud.                                                                                                                                                                                                                                                                                                                                      |
| Bake Selected Groups to Mesh                                                                                                                           | bakeMesh          | N/A           | <p>Click to convert the selected groups to a mesh using Poisson Surface Reconstruction.</p> <p>Mesh creation is based on the SGP 2006 paper, Poisson Surface Reconstruction by Michael Kazhdan, Matthew Bolitho, and Hugues Hoppe. The original source code and paper can be found at <a href="http://www.cs.jhu.edu/~misha/Code/PoissonRecon/">http://www.cs.jhu.edu/~misha/Code/PoissonRecon/</a>.</p> |
| Samples                                                                                                                                                | samplesPerNode    | 1             | <p>Specifies the minimum number of sample points used to calculate mesh points, using floating point values.</p> <p>For noise-free point clouds, lower values in the range 1.0 - 5.0 can be used. For more noisy samples, higher values in the range 15.0 - 20.0 may provide a smoother mesh.</p>                                                                                                        |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                          |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                                                                                                                             |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the                                                                                                                                                                                                                                                                                                |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | render aborts.                                                                                                                                       |
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |

# PoissonMesh

The PoissonMesh node (NukeX and Nuke Studio only) uses information from a dense point cloud to generate a mesh that you can further use as a 3D object, in 3D modeling for instance. The PoissonMesh node is based on the Poisson Surface Reconstruction calculation method. The original source code and paper were created by Michael Kazhdan, Matthew Bolitho, and Hugues Hoppe (for more information, see <http://www.cs.jhu.edu/~misha/Code/PoissonRecon/>).

See also [PointCloudGenerator](#) and [ModelBuilder](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | unnamed         | The PointCloudGenerator node on which the mesh is based. |

| Control (UI)    | Knob (Scripting) | Default Value | Function |
|-----------------|------------------|---------------|----------|
| PoissonMesh Tab |                  |               |          |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use Selection | useSelection     | enabled       | When enabled, selection flags from GeoSelect nodes further up the tree are used to create the mesh.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Filtering     | useFiltering     | enabled       | When enabled, only faces with normals similar to those of the input are created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Depth         | depth            | 8             | <p>Sets the maximum depth of the calculation tree that is used for surface reconstruction.</p> <p>You can also think of it as the density of the voxels (volumetric pixel) used by the solver. Running at depth <b>d</b> corresponds to solving on a voxel grid whose resolution is no larger than <math>2^d \times 2^d \times 2^d</math>. Note that since the reconstructor dynamically adapts the octree, the specified reconstruction depth is only an upper bound.</p> <div>  <p><b>Note:</b> Each increment increases the solver's potential memory usage by 8 times, so keep it as low as possible. Due to the scaling of memory requirements with each increment, the maximum value is 10.</p> </div> |
| Scale         | scale            | 1.25          | Sets the floating point ratio between the 3D cube used to create the mesh and the bounding box of the footage it's created from.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Solver Divide | solverDivide     | 8             | Sets the depth at which the solver equation is used in the creation of your mesh. Using this parameter can help reduce the memory overhead at the cost of a small increase in reconstruction time. For example, with a reconstruction <b>Depth</b> of 9 or higher, a subdivide depth of 7 or 8 can reduce the memory usage.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Iso Divide    | isoDivide        | 8             | Sets the depth at which the iso-surface extractor is used in extraction. This can help you reduce your memory usage when generating complex meshes. For example, with a reconstruction <b>Depth</b> of 9 or higher, a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | subdivide depth of 7 or 8 can reduce the memory usage.                                                                                                                                                                                                                                                                                              |
| Samples per Node | samplesPerNode   | 1             | Sets the minimum number of sample points used to create your mesh. <ul style="list-style-type: none"> <li>• For noise-free samples, small values in the range [1.0 - 5.0] are acceptable.</li> <li>• For more noisy samples, larger values in the range [15.0 - 20.0] may be needed to provide a smoother, noise-reduced reconstruction.</li> </ul> |
| Confidence       | confidence       | disabled      | When enabled, the size of the normals is used as confidence information when generating the mesh. This may take longer, but can give you better results - your point cloud point creation is double-checked.                                                                                                                                        |

# PositionToPoints

Generates a 3D point cloud from an xyz image, such as a position pass. If all the data is in multiple channels in the input image, then set the **surface point** to the channels that contain the xyz data in the input image, and optionally set the **surface normal** to the channels with the point normals. If you have the xyz and normals in separate image streams, you can instead connect the xyz stream to the **pos** input and optionally connect the normals to the **norm** input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image from which the point cloud is generated, if all xyz data resides in one image. This is also where the color information for the point cloud is taken from. |

| Connection Type | Connection Name | Function                                                                                                   |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------|
|                 | pos             | The image containing positional data. Note that this input is hidden until the unnamed input is connected. |
|                 | norm            | The image containing normals data. Note that this input is hidden until the <b>pos</b> input is connected. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PositionToPoints Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| display              | display          | solid         | <p>Adjusts the display characteristics of 3D objects. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable           | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| render               | render_mode      | solid         | Sets how the points will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| cast shadow          | cast_shadow      | enabled       | When enabled, the object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| receive shadow       | receive_shadow   | enabled       | When enabled, and a material shader is added to the object, the object can receive shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| frame range          | frame_first      | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                            |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | be used to display the offset used in the TimeOffset node.                                                                                                                          |
|                | frame_last       | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node. |
| surface point  | P_channel        | none          | The point positions are taken from these channels in the first input. If the <b>pos</b> input is used these channels are ignored.                                                   |
| surface normal | N_channel        | none          | The point normals are taken from these channels in the first input. If the <b>norm</b> input is used these channels are ignored.                                                    |
| point detail   | detail           | 0.5           | Controls the number of available points to display in the Viewer. A value of 0 means no points are displayed. A value of 1 displays all available points.                           |
| point size     | pointSize        | 5             | Controls the display size of the points in the Viewer.                                                                                                                              |

# PrmanRender

PrmanRender (NukeX and Nuke Studio only) is a render node that works together with Pixar's PhotoRealistic RenderMan® Pro Server 20, or earlier, to give you an even better quality render result. PrmanRender is an alternative to Nuke's [ScanlineRender](#) with additional features for rendering 3D scenes. With PrmanRender, you have control over aspects like shadows and reflections in your render result.

In order to use the PrmanRender node, you need to have Pixar's RenderMan Pro Server 20, or earlier, installed and licensed on your machine.

See also [ScanlineRender](#), [Reflection](#), and [Refraction](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | cam             | An optional camera input. The scene is rendered from the perspective of this camera. If the camera input is not connected, PrmanRender uses a default camera positioned at the origin and facing in the negative Z direction.                               |
|                 | obj/scn         | Either: <ul style="list-style-type: none"> <li>• A Scene node that is connected to the objects and lights you want to render, or</li> <li>• a 3D object or MergeGeo node.</li> </ul>                                                                        |
|                 | bg              | An optional background input. This can be used to composite a background image into the scene and to determine the output resolution. If not used, this defaults to <b>root.format</b> or <b>root.proxy_format</b> defined in the <b>Project Settings</b> . |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PrmanRender Tab |                  |               |                                                                                                                                                                       |
| shadows         | shadows          | disabled      | When enabled, add shadows to your render. You can adjust the parameters for your shadows using the <a href="#">Light</a> node's <b>Shadows</b> tab.                   |
| reflections     | reflections      | disabled      | When enabled, add reflections to your render. You can adjust the parameters for your reflections using the <a href="#">Reflection</a> node's <b>Properties</b> panel. |
| refractions     | refractions      | disabled      | When enabled, add refractions to your render. You can adjust the parameters for your refractions using the <a href="#">Refraction</a> node's <b>Properties</b> panel. |
| dof             | dof              | disabled      | When enabled, add depth of field to your render.                                                                                                                      |
| projection mode | projection_mode  | render camera | Sets the projection mode during render:                                                                                                                               |

| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               | <ul style="list-style-type: none"> <li>• <b>perspective</b> - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture.</li> <li>• <b>orthographic</b> - objects are viewed using parallel projection.</li> <li>• <b>render camera</b> - take the projection mode from the camera input.</li> </ul>                                                                                                                              |
| overscan           | overscan           | 0             | Sets the number of pixels to render beyond the left/right and top/bottom of frame, if requested by subsequent operations.                                                                                                                                                                                                                                                                                                                                                           |
| ambient            | ambient            | 0             | Sets the global ambient light level.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Sampling Tab       |                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| raytrace max depth | raytrace_max_depth | 5             | Sets the maximum number of specular reflection and refraction bounces PrmanRender uses to trace your scene and make render calculations.                                                                                                                                                                                                                                                                                                                                            |
| pixel samples      | pixel_samples      | 10            | <p>Sets the number of samples to render per pixel. Having more samples increases your render quality, but also increases render time.</p> <div>  <b>Note:</b> Setting this value to 1 turns antialiasing off.         </div>                                                                                                                                                                     |
| shading rate       | shading_rate       | 0.5           | <p>Sets the number of shading calculations for primitives. For example, a shading rate of 1.0 specifies one shading sample per pixel.</p> <p>This value, along with <b>pixel samples</b>, directly affects your rendering time and the final quality of your results. A low shading rate value means your render will take more time, but the quality will be very high. A high value on the other hand means your render is faster, but the final quality will not be as good.</p> |

| Control (UI)        | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|--------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filter              | filter                   | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> </ul> |
| antialiasing filter | antialiasing_filter      | Box           | Sets the antialiasing method used to filter the pixel samples into the final color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| antialiasing        | antialiasing_filter_size | 1             | Sets the size of the antialiasing pixel filter to be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| filter size         |                  |               | used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| motion blur samples | samples          | 1             | <p>Sets the number of samples to render, per pixel, to produce motion blur. The maximum is 5.</p> <p>This determines the number of samples of the 3D scene used so as low a value as possible is best for setup speed and memory use. If the motion in the scene over the shutter period is relatively linear, lower values can be used. If the motion is complex, then values toward the higher end of the range may be required.</p> <p>If the rendered result shows banding or stepping that looks like too few motion blur samples, first try increasing the 'pixel samples' setting.</p>                                                                                                                                                                                                                  |
| shutter             | shutter          | 0.5           | Sets the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| shutter offset      | shutteroffset    | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you</li> </ul> |



| Control (UI)           | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|----------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                            |               | specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.                                                                                                         |
| shuttercustom offset   | shuttercustomoffset        | 0             | If the <b>shutter offset</b> parameter is set to <b>custom</b> , this parameter is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.                                                                                                                              |
| randomize time         | temporal_jitter            | 0             | Adds randomness to the distribution of samples in time so they don't produce regularly spaced images. The larger the value, the larger the time difference between the samples.                                                                                                                                                                                                            |
| shutter opening        | shutter_opening            | None          | Sets the shutter opening mode: <ul style="list-style-type: none"> <li>• <b>None</b> - instantaneous open and close.</li> <li>• <b>Linear</b> - the shutter opens and closes in linear intervals.</li> <li>• <b>Bezier</b> - the shutter opens and closes more gradually, according to a Bezier curve.</li> </ul>                                                                           |
| Shader Tab             |                            |               |                                                                                                                                                                                                                                                                                                                                                                                            |
| motion vectors         | output_motion_vectors_type | distance      | Sets the type of vectors you'd like to render: <ul style="list-style-type: none"> <li>• <b>off</b> - no motion vector information is rendered.</li> <li>• <b>velocity</b> - store the velocity of every single pixel in the motion vector channels.</li> <li>• <b>distance</b> - for every pixel, store the distance (in pixels) between samples in the motion vector channels.</li> </ul> |
| motion vector channels | MB_channels                | forward       | When <b>motion vectors</b> is set to anything other than <b>off</b> , the selected vector type is written to this channel or channels.                                                                                                                                                                                                                                                     |

| Control (UI)   | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------|-----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| output vectors | output_shader_vectors | disabled      | When enabled, shader vectors are output as well as motion vectors.                                                                                                                                                                                                                                                                                                                                                     |
| surface points | P_channel             | none          | When <b>output vectors</b> is enabled, the shader vector surface points are written to this channel or channels.                                                                                                                                                                                                                                                                                                       |
| surface normal | N_channel             | none          | When <b>output vectors</b> is enabled, the shader vector surface normals are written to this channel or channels.                                                                                                                                                                                                                                                                                                      |
| RIB Tab        |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| filter         | ribFilter             | disabled      | <p>When enabled, filter the scene information generated by Nuke for RenderMan. Nuke then calls a Python function called <b>nukescripts.renderman.filterRIB</b>.</p> <div>  <b>Note:</b> Filtering can make the render start up slightly slower as a temporary RIB file is created for each render. </div>                            |
| arguments      | filterArgs            | none          | <p>When <b>filter</b> is enabled, specify your filter arguments. This string is passed by Nuke's Python filter function as extra arguments to RenderMan. If you want to use your own filter, you can also replace Nuke's Python function, and have your arguments passed directly to your own Python function.</p> <p>For example, set the filter arguments to <b>-rif myfilter.so</b> to load your own RI filter.</p> |
| ouput          |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| file           | file                  | none          | Sets the RIB dump file path and name.                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                   |               |  <b>Tip:</b> For multiple frames use the #### pattern.                                                                                                                                                           |
| Execute                                                                                                                                                | Execute           | N/A           | <p>Click to dump RIB files for a given sequence the path specified in the <b>file</b> control.</p> <div>  <b>Note:</b> You can execute from the command line using the <b>-X nodeName</b> switch.         </div> |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                   |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                      |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                                                                          |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.                                                                                                                                              |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                                                                                                                                                                         |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                                                                                                                                                                            |

# ProceduralNoise

The ProceduralNoise (or ProcGeo) node lets you modify your 3D geometry objects using a Perlin noise function that creates seemingly random noise. For example, you could use this node to generate animated noise for rippling waves or clouds, or to create a terrain from a flat card.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to modify using a noise function, for example, a Card node. If you want to modify several objects together, you can also connect a MergeGeo node here. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ProcGeo Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| display      | display          | unchanged     | <p>Adjusts the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable   | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| render                 | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                              |
| ProceduralNoise Method | mode             | Turbulence    | Choose the type of noise to use: <ul style="list-style-type: none"> <li>• <b>fBm</b> (fractional Brownian motion) runs noise() "octave" times at different scales to get random numbers between -1 and +1 and adds them up.</li> <li>• <b>turbulence</b> is the same as <b>fBm</b> except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1.</li> </ul> |
| Orientation            | orient           | Z             | Select the values to modify: <ul style="list-style-type: none"> <li>• <b>X</b> - only modify the values on the x axis.</li> <li>• <b>Y</b> - only modify the values on the y axis.</li> <li>• <b>Z</b> - only modify the values on the z axis.</li> <li>• <b>All</b> - modify the values on the x, y, and z axes.</li> </ul>                                                                            |
| X Size                 | x_size           | 4             | The amount of noise on the x axis.                                                                                                                                                                                                                                                                                                                                                                      |
| X Offset               | x_offset         | 0             | Offsets the noise effect on the x axis.                                                                                                                                                                                                                                                                                                                                                                 |
| Y Size                 | y_size           | 4             | The amount of noise on the y axis.                                                                                                                                                                                                                                                                                                                                                                      |
| Y Offset               | y_offset         | 0             | Offsets the noise effect on the y axis.                                                                                                                                                                                                                                                                                                                                                                 |
| Octaves                | octaves          | 5             | The amount of detail of the noise.                                                                                                                                                                                                                                                                                                                                                                      |
| Lacunarity             | lacunarity       | 2.5           | The size distribution of the empty space in between noise instances.                                                                                                                                                                                                                                                                                                                                    |
| Gain                   | gain             | 0.5           | The amount of noise gain.                                                                                                                                                                                                                                                                                                                                                                               |
| Speed                  | speed            | 1.1           | The speed with which the noise changes over time.                                                                                                                                                                                                                                                                                                                                                       |

# Project3D

The Project3D node projects an input image through a camera onto the 3D object.

See also [UVProject](#).

# Inputs and Controls

| Connection Type | Connection Name | Function                                           |
|-----------------|-----------------|----------------------------------------------------|
| Input           | cam             | The Camera controlling the projection.             |
|                 | unnamed         | The 2D image you're using for the surface texture. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                           |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project3D Tab  |                  |               |                                                                                                                                                                                                                                    |
| project on     | project_on       | both          | Controls whether the image is projected on the <b>front</b> facing, <b>back</b> facing, or <b>both</b> polygons.                                                                                                                   |
| crop           | crop             | enabled       | When enabled, the input image is extended at its edges with black. To extend the image with the image edge colors, disable <b>crop</b> .                                                                                           |
| occlusion mode | occlusion_mode   | disabled      | If you want to use raycasting to determine which parts of the object are occluded, check <b>self</b> to see the geometry connected to the shader or check <b>world</b> to see all the geometries in a scene that causes occlusion. |

# RadialDistort

The RadialDistort node is a non-linear transformation of the vertices along directions from the object center, giving either a barrel or pin-cushion distortion.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                           |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object whose shape you want to modify. If you want to distort several objects together, you can also connect a MergeGeo node here. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RadialDistort Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| display           | display          | unchanged     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable        | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| render            | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| distortion        | distortion       | 0             | Sets the amount of distortion. Values below 0 produce a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                             |
|-----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | barrel distortion, whereas values above 0 produce a pin-cushion distortion. If you set the value to 0, the 3D object is not distorted.                               |
| power bias      | power_bias       | 4             | The magnitude of the distortion. The higher the value, the more distorted the object becomes.                                                                        |
| rotation center | center           | 0,0,0         | Move the center point of the rotation by entering its X, Y, and Z coordinates here.<br><br>You can also move the center point by dragging its control in the Viewer. |
| scale           | scale            | 1,1,1         | The amount of distortion in the x, y, or z directions.<br><br>You can also adjust this by dragging the control in the Viewer.                                        |
| preserve center | preserve_center  | enabled       | Check to keep the object centered in its original place in the 3D space. Uncheck to allow the object offset from its center.                                         |

# RayRender

When connected to a [Scene](#) node, the RayRender node renders all the objects and lights connected to that scene from the perspective of the [Camera](#) connected to the **cam** input (or a default camera if no **cam** input exists). The rendered 2D image is then passed along to the next node in the compositing tree, and you can use the result as an input to other nodes in the script.

See also [PrmanRender](#), [ScanlineRender](#), [Scene](#), and [Camera](#).



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                    |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | cam             | An optional camera input. The scene is rendered from the perspective of this camera. If the camera input is not connected, RayRender uses a default camera positioned at the origin and facing in the negative Z direction.                                 |
|                 | obj/scn         | Either: <ul style="list-style-type: none"> <li>• A Scene node that is connected to the objects and lights you want to render, or</li> <li>• a 3D object or MergeGeo node.</li> </ul>                                                                        |
|                 | bg              | An optional background input. This can be used to composite a background image into the scene and to determine the output resolution. If not used, this defaults to <b>root.format</b> or <b>root.proxy_format</b> defined in the <b>Project Settings</b> . |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RayRender Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| filter        | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4, Lanczos6, and Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. Lanczos4 provides the least sharpening and Sinc4 the most.</li> </ul> |
| projection mode | projection_mode  | render camera | <p>The projection modes are:</p> <ul style="list-style-type: none"> <li>• <b>perspective</b> - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera.</li> <li>• <b>orthographic</b> - use orthographic projection (projection onto the projection plane using parallel rays).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)          | Knob (Scripting)              | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------|-------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                               |               | <ul style="list-style-type: none"> <li>• <b>spherical</b> - have the entire 360-degree world rendered as a spherical map. You can increase tessellation max to increase the accuracy of object edges as they are warped out of line, but this takes longer to render.</li> <li>• <b>render camera</b> - use the projection type of the render camera.</li> </ul>                                                                                                                                                                                                                                                                                         |
| stochastic samples    | stochastic_samples            | 0             | <p>Sets the number of samples, per pixel, to use in stochastic estimation (zero is disabled). Lower values result in faster renders, while higher values improve the quality of the final image.</p> <p>Stochastic sampling is based on Robert L. Cook's <i>Stochastic Sampling in Computer Graphics</i>, available in <i>ACM Transactions on Graphics</i>, Volume 6, Number 1, January 1996.</p> <div>  <b>Note:</b> It is recommended for motion blur that the samples control is adjusted. This also provides anti-aliasing by jittering the sample point. </div> |
| intersection epsilon  | triangle_intersection_epsilon | 0.000035      | Sets the error threshold for the triangle ray intersection calculations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| MotionBlur Tab        |                               |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| interpolate animation | interpolate_animation         | disabled      | <p>When enabled, interpolate between animation keyframes during the <b>shutter</b> aperture.</p> <p>When disabled, no interpolation is</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                      |               | <p>calculated.</p> <p>Enabling interpolation can decrease the number of keyframes and <b>stochastic samples</b> required to produce motion blur, but may introduce deviation from the motion direction.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| samples              | samples              | 1             | Sets the number of keyframes used to reconstruct motion blur during the <b>shutter</b> aperture.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform distribution | uniform_distribution | disabled      | When enabled, use a uniform temporal distribution of scenes to sample. This generates more accurate results for stochastic multisampling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| shutter              | shutter              | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| shutter offset       | shutteroffset        | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the</li> </ul> |

| Control (UI)                        | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------|-----------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                       |               | <p>shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</p> <ul style="list-style-type: none"> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.</li> </ul> |
| shutter custom offset               | shuttercustomoffset   | 0             | <p>If the shutter offset parameter is set to custom, this parameter is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame.</p>                                                                                                                                                                                                                                       |
| match ScanlineRender shutter offset | use_scanline_shutter  | disabled      | <p>When enabled, assume a <b>sample</b> value of 1 and a <b>shutter offset</b> of 0, unless a custom <b>shutter offset</b> is in use.</p> <p>When disabled, set the required <b>sample</b> value.</p>                                                                                                                                                                                                                                                                                       |
| AOVs Tab                            |                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| output AOV                          | output_shader_vectors | disabled      | <p>When enabled, all the arbitrary output variables specified are passed into the specified channels.</p>                                                                                                                                                                                                                                                                                                                                                                                   |
| remove AOV from beauty pass         | remove_from_beauty    | enabled       | <p>When enabled, the specified AOV are not included in the output of the node.</p> <p>When disabled, all specified AOV</p>                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                            |
|--------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                     |               | channels are output.                                                                                                                                                                                                                                                |
| surface point      | AOV_Point           | none          | When output vectors is enabled, these dropdowns allow you to split out the various AOV into specific channels for use later on in the node tree.                                                                                                                    |
| surface normal     | AOV_Normal          | none          |                                                                                                                                                                                                                                                                     |
| motion vector      | AOV_Motion          | none          |                                                                                                                                                                                                                                                                     |
| solid color        | AOV_Solid           | none          |                                                                                                                                                                                                                                                                     |
| direct diffuse     | AOV_Direct_Diffuse  | none          |                                                                                                                                                                                                                                                                     |
| direct specular    | AOV_Direct_Specular | none          |                                                                                                                                                                                                                                                                     |
| reflection         | AOV_Reflection      | none          |                                                                                                                                                                                                                                                                     |
| emissive           | AOV_Emissive        | none          |                                                                                                                                                                                                                                                                     |
| Camera Tab         |                     |               |                                                                                                                                                                                                                                                                     |
| Stereo Scan Enable | stereoScan          | disabled      | When enabled, the controls on the <b>Camera</b> tab are enabled, allowing you to scan stereo footage.<br><br>When disabled, the controls on the <b>Camera</b> tab are disabled.                                                                                     |
| Left View          | leftView            | N/A           | Sets the view to use for the left eye in the output.                                                                                                                                                                                                                |
| Right View         | rightView           | N/A           | Sets the view to use for the right eye in the output.                                                                                                                                                                                                               |
| Eye Separation     | eyeSeparation       | 0.065         | Determines how far apart the two views are, from a viewer's perspective. If you set the <b>Eye Separation</b> , or interpupillary distance (IPD), too low, objects in the scene appear crushed horizontally, but raising it too high can leave holes in the stitch. |

| Control (UI)         | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                             |               | The IPD is measured in the same units as the <b>Rig Size</b> control in the upstream C_CameraSolver properties, so adjust it accordingly.                                                                                                                                                                                                                                                                                                                                                                      |
| Convergence Distance | convergenceDistance         | 100           | Sets the distance to the zero parallax point, where the scene is in focus.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Falloff Type         | falloffType                 | Cosine        | <p>Determines how pole merging is handled:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - no IPD adjustment occurs towards the poles.</li> <li>• <b>Linear</b> - the views are merged gradually from the <b>Start Angle</b> specified toward the pole. Increasing the angle moves the start point toward the poles.</li> <li>• <b>Cosine</b> - the views are merged smoothly toward the poles. Reducing the <b>Separation Falloff</b> shifts the transition in depth towards the poles.</li> </ul> |
| Start Angle          | separationFalloffStartAngle | 0             | <p>Sets the point at which falloff begins when <b>Falloff Type</b> is set to <b>Linear</b>.</p> <p>Increasing the value pushes the merge point toward the poles, a value of 90 disables pole merging entirely.</p>                                                                                                                                                                                                                                                                                             |
| Falloff Exponent     | separationFalloffExponent   | 1             | <p>Sets the rate off falloff for the eye separation towards the poles when <b>Falloff Type</b> is set to <b>Cosine</b>.</p> <p>A value of 1 produces smooth merging toward the poles for the left and right views.</p> <p>Reducing the value pushes the merge</p>                                                                                                                                                                                                                                              |

| Control (UI)           | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|---------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                     |               | point toward the poles, a value of 0 disables pole merging entirely.                                                                                                                                                                                                                                                                                                   |
| Sample Ray From Camera | sampleRayFromCamera | disabled      | <p>When enabled, sample rays with respect to the capture radius for a camera rig.</p> <p>Enable this control to match stereoscopic image stitches generated for a horizontal ring of cameras with a diameter set by the <b>Rig Size</b> control.</p>                                                                                                                   |
| Rig Size               | rigDiameter         | 0.1           | <p>Sets the diameter of the camera rig used to generate a corresponding stereoscopic image stitch, when <b>Sample Ray From Camera</b> is enabled.</p> <div>  <p><b>Note:</b> The <b>Rig Size</b> diameter should always be greater than the <b>Eye Separation</b> value.</p> </div> |

# ReadGeo

Imports geometry from a specified location. You can read in:

- Alembic (**.abc**) files containing meshes or point clouds. The mesh's vertices, normals, UVs, and vertex colors are read on a per frame basis or at the first frame. Materials and textures are not read in. Any cameras in the file are passed to Camera nodes.  
For more information on Alembic, see <http://code.google.com/p/alembic/>
- FBX (**.fbx**) files containing meshes or point clouds. The mesh's vertices, normals, UVs, and vertex colors are read on a per frame basis or at the first frame. Materials and textures are not read in. Any cameras in the file are passed to Camera nodes.
- OBJ (**.obj**) files
- USD (**.usd/.usda**) files containing meshes and point clouds. The mesh's vertices, normals, UVs, and vertex colors are read on a per frame basis or at the first frame. Materials and textures are not read in. Cameras



are not currently supported and are grayed-out in the scenegraph.

For more information on USD, see <https://graphics.pixar.com/usd/docs/index.html>

See also [WriteGeo](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | img             | The texture to project on to the imported geometry. |

| Control (UI)        | Knob (Scripting)   | Default Value           | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ReadGeo Tab         |                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| file                | file               | none                    | <p>Enter the file path and file name or use the folder icon to browse to the required location.</p> <p>Reading <b>.abc</b> and <b>.usd</b> files containing more than one object displays a scenegraph load dialog that allows you to create separate ReadGeo nodes from parents in the scenegraph. See <a href="#">Importing ABC Files</a> or <a href="#">Importing USD Files</a> for more information.</p>                                                                                                                                                                                                                                                                                                                            |
| Localization Policy | localizationPolicy | from auto-localize path | <p>Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times:</p> <ul style="list-style-type: none"> <li>• <b>on</b> - the files are cached, regardless of location, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>from auto-localize path</b> - the files are cached if they reside in the <b>auto-localize from</b> directory, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>on demand</b> - only localize these source clips when you manually update them. See <a href="#">Nuke's Online Help</a> for more information.</li> <li>• <b>off</b> - the files are never cached, regardless of location.</li> </ul> |

| Control (UI) | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|--------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Update       | updateLocalization | N/A           | When this ReadGeo node is set to <b>Localization Policy &gt; on demand</b> , click <b>Update</b> to manually localize the files from the source files.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| reload       | reload             | N/A           | Click to reload the geometry from disk, overwriting any changes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| frame range  | range_first        | 1             | Sets the start frame for the frame range displayed in the Viewer when the frame slider range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|              | range_last         | 1             | Sets the end frame for the frame range displayed in the Viewer when the frame slider range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| display      | display            | textured      | <p>Adjust the display characteristics of the object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable   | selectable         | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render       | render_mode        | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| cast shadow                                                                         | cast_shadow      | enabled       | When enabled, the object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| receive shadow                                                                      | receive_shadow   | enabled       | When enabled, and a material shader has been added to the geometry, the object can receive shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Transform Tab                                                                       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |
| transform order                                                                     | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| rotation order                                                                      | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| translate                                                                           | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| rotate         | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. you can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| scale          | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale  | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew           | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| specify matrix | useMatrix        | N/A           | Enable this to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                     |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                   |

## ABC

| Control (UI)                                                                          | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABC Options - These controls are only shown if you have imported an <b>.abc</b> file. |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| read on each frame                                                                    | read_on_each_frame  | enabled       | <p>When enabled, ReadGeo bakes each object's transform into the mesh points and preserves the animation.</p> <p>This should be enabled for animated objects.</p>                                                                                                                                                                                                                                                                                         |
| sub frame                                                                             | sub_frame           | enabled       | <p>When enabled, objects are read on sub frames which can be used to render motion blur.</p> <div>  <b>Tip:</b> Disable <b>sub frame</b> for faster UI interaction.         </div>                                                                                                                                                                                      |
| lock frame                                                                            | lock_frame          | 1             | When <b>read on each frame</b> is disabled, the object is read at this frame.                                                                                                                                                                                                                                                                                                                                                                            |
| frame rate                                                                            | frame_rate          | 24            | The frame rate (frames per second) to use to sample the animation.                                                                                                                                                                                                                                                                                                                                                                                       |
| render points as                                                                      | point_render_mode   | point clouds  | <p>Determines how point primitives are rendered:</p> <ul style="list-style-type: none"> <li>• <b>point clouds</b> - Render primitives as Nuke point clouds.</li> <li>• <b>particles</b> - Render primitives as Nuke particles.</li> </ul>                                                                                                                                                                                                                |
| use geometry colors                                                                   | use_geometry_colors | disabled      | <p>When enabled, apply geometry color attributes read from <b>.abc</b> files and apply them to the Nuke geometry.</p> <div>  <b>Note:</b> Disabling <b>use geometry colors</b> can cause differences in rendered output when compared to previous versions of Nuke. If this occurs, enable <b>use geometry colors</b> in the ReadGeo properties panel.         </div> |

## Scenegraph Tab

|            |            |     |                                                                             |
|------------|------------|-----|-----------------------------------------------------------------------------|
| scene view | scene_view | N/A | Displays the mesh nodes in the scene. The point cloud nodes are not listed. |
|------------|------------|-----|-----------------------------------------------------------------------------|



| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                  |               | <p>By default, only meshes imported into this ReadGeo node are shown. To view all meshes that exist in the Alembic file, enable <b>view entire scenegraph</b>.</p> <p>The <b>Load</b> icons on the left indicate the state of each item in the list:</p> <ul style="list-style-type: none"> <li>• <b>A gray dot</b> - The item isn't loaded into this ReadGeo node or is hidden.</li> <li>• <b>An orange bar</b> - The item is loaded into this ReadGeo node, and is a child of a parent item somewhere further up the tree. This icon turns gray if you select the item in the list.</li> </ul> <p>Click the <b>Load</b> icons to show and hide the selected item and its children.</p> |
| view entire scenegraph | all_objects      | disabled      | <p>When disabled, only meshes imported into this ReadGeo node are shown.</p> <p>When enabled, all meshes that exist in the Alembic file are displayed. This allows you to show or hide imported items by clicking on the icons on the left. Alternatively, you can choose <b>select</b> or <b>deselect</b> from the right-click menu.</p> <p>To select or deselect multiple items, press <b>Ctrl/Cmd</b> or <b>Shift</b> while clicking them.</p>                                                                                                                                                                                                                                        |

## FBX

| Control (UI)                                                                          | Knob (Scripting) | Default Value     | Function                                                                                                                                                    |
|---------------------------------------------------------------------------------------|------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FBX Options - These controls are only shown if you have imported an <b>.fbx</b> file. |                  |                   |                                                                                                                                                             |
| animation stack                                                                       | fbx_take_name    | dependent on file | The take you want to use from the <b>.fbx</b> file. FBX supports multiple takes in one file. Usually, one of the takes is a default take with no animation. |

| Control (UI)             | Knob (Scripting)   | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| node name                | fbx_node_name      | dependent on file | The mesh node you want to import from the <b>.fbx</b> file.<br><br>Point cloud nodes are not listed.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| frame rate               | frame_rate         | 24                | The frame rate (frames per second) to use to sample the animation curves. To use this rate rather than the one defined in the FBX file, check <b>use frame rate</b> .                                                                                                                                                                                                                                                                                                                                                                                       |
| use frame rate           | use_frame_rate     | disabled          | When enabled, the <b>frame rate</b> defined above is used to sample the animation curves.<br><br>When disabled, the frame rate defined in the <b>.fbx</b> file is used to sample the animation curves.                                                                                                                                                                                                                                                                                                                                                      |
| object type              | object_type        | Mesh              | Select the object type:<br><ul style="list-style-type: none"><li>• <b>Mesh</b> - Import a single mesh or all the meshes (or NURBS curves/patch surfaces converted to meshes) from the <b>.fbx</b> file.</li><li>• <b>Point Cloud</b> - Import a point cloud from the <b>.fbx</b> file.</li></ul>                                                                                                                                                                                                                                                            |
| all objects              | all_objects        | disabled          | When enabled, ReadGeo imports all the meshes in the <b>.fbx</b> file rather than just one. This overrides whatever you have selected under <b>node name</b> .                                                                                                                                                                                                                                                                                                                                                                                               |
| read on each frame       | read_on_each_frame | enabled           | When enabled, ReadGeo bakes each object's transform into the mesh points and preserves the animation.<br><br>This should be enabled for animated objects.                                                                                                                                                                                                                                                                                                                                                                                                   |
| read transform from file | read_from_file     | enabled           | When enabled, transform properties are imported from the <b>.fbx</b> file and, while you can view them and use them in expressions, you cannot modify them. Whenever you reload the script, the transform properties are re-read from the <b>.fbx</b> file to ensure they match the file content.<br><br>When disabled, you can modify the transform properties imported from the <b>.fbx</b> file using the transform controls, and your changes are kept even if the script is reloaded.<br><br>Note that geometry data is always read from the FBX file. |

## OBJ

| Control (UI)                                                                          | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OBJ Options - These controls are only shown if you have imported an <b>.obj</b> file. |                      |               |                                                                                                                                                                                                                                                                                                                                                                                         |
| update mode                                                                           | update_mode          | all           | Sets the update mode for the OBJ geometry: <ul style="list-style-type: none"> <li>• <b>all</b> - loads all geometry groups for each frame.</li> <li>• <b>point-cloud</b> - loads only point and point attributes group data at each frame. The <b>primitives frame</b> control specifies which frame in the sequence contains the primitive and vertex attribute group data.</li> </ul> |
| primitives frame                                                                      | full_geometry_frame  | 1             | When <b>update mode</b> is set to <b>point-cloud</b> , sets which frame in the sequence contains the primitive and vertex attribute group data.                                                                                                                                                                                                                                         |
| read texture w coord                                                                  | read_texture_w_coord | enabled       | When enabled, <b>w</b> coordinates are read along with <b>uv</b> coordinates, where present. <div>  <b>Tip:</b> Occasionally, <b>w</b> values contain garbage, so you may want to disable this control to use a value of 1 instead.           </div>                                                 |

## USD

| Control (UI)                                                                                         | Knob (Scripting)   | Default Value | Function                                                                                              |
|------------------------------------------------------------------------------------------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------|
| USD Options - These controls are only shown if you have imported a <b>.usd</b> or <b>.usda</b> file. |                    |               |                                                                                                       |
| read on each frame                                                                                   | read_on_each_frame | enabled       | When enabled, ReadGeo bakes each object's transform into the mesh points and preserves the animation. |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               |  <b>Note:</b> <b>read on each frame</b> should be enabled for animated objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Scenegraph Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| scene view     | scene_graph      | N/A           | <p>Displays all items in the file, including currently unsupported items such as cameras.</p> <p>The <b>Load</b> column displays the state of each item in the file:</p> <div>  <b>Note:</b> Grayed-out items are currently unsupported.         </div> <ul style="list-style-type: none"> <li>• <b>A gray dot</b> - The item isn't loaded into this ReadGeo node or is hidden.</li> <li>• <b>An orange bar</b> - The item is loaded into this ReadGeo node, and is a child of a parent item somewhere further up the tree. This icon turns gray if you select the item in the list.</li> <li>• <b>A broken orange bar</b> - The item is partially loaded, meaning that some children of the item are not loaded.</li> </ul> <p>You can show or hide imported items by clicking on the icons in the <b>Load</b> column. Alternatively, you can choose <b>select</b> or <b>deselect</b> from the right-click menu.</p> <p>The <b>Type</b> column displays at a glance what the file contains, such as meshes and cameras.</p> <div>  <b>Note:</b> By default, only items imported into this ReadGeo node are shown. To view all items that exist in the USD file, enable <b>view entire scenegraph</b>.         </div> |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| view entire scenegraph | all_objects      | disabled      | <p>When disabled, only items imported into this ReadGeo node are shown.</p> <p>When enabled, all meshes that exist in the USD file are displayed. This allows you to show or hide imported items by clicking on the icons on the left. Alternatively, you can choose <b>select</b> or <b>deselect</b> from the right-click menu.</p> <p>To select or deselect multiple items, press <b>Ctrl/Cmd</b> or <b>Shift</b> while clicking them.</p> |

# Reflection

Reflection is the familiar physical phenomenon where an image of an object is cast back from a particular kind of surface, such as glass or water. Using the [PositionToPoints](#) node, you can replicate this effect in your render result of 3D objects, and using the Reflection node, you can adjust the controls for creating the reflection effect.

Nuke's [RayRender](#) node and [PrmanRender](#) use raytracing to create this effect and you can use the Reflection node to adjust the result.



**Note:** ScanlineRender cannot produce reflections using the Reflection node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>Either:</p> <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding</li> </ul> |

| Connection Type | Connection Name | Function                                                                                                                                                                   |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | several shader nodes one after the other allows you to produce more complex effects.                                                                                       |
| Output          | unnamed         | The 3D geometry object to which you want to apply a reflection effect. If you want to apply the same effect to several objects, you can also connect a MergeGeo node here. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                              |
|------------------|------------------|---------------|---------------------------------------|
| Reflection Tab   |                  |               |                                       |
| reflection_color | reflection_color | 1             | Sets the color of the reflection.     |
| value            | reflection_value | 1             | Sets the intensity of the reflection. |

# Refraction

Refraction is the familiar physical phenomenon of light traveling differently through different materials and thus reflecting differently off objects behind that material. For example, if you have a glass of water with a straw in it, the part of the straw that's not in water appears to be in a different angle to the part that is in the water. This is due to water bending the light waves.

**PrmanRender** uses raytracing to create this effect and you can use the Refraction node to adjust the result. Without the PrmanRender node and RenderMan Pro Server software though, the Refraction node has no effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |
| Output          | unnamed         | The 3D geometry object to which you want to apply a refraction effect. If you want to apply the same effect to several objects, you can also connect a MergeGeo node here.                                                                                                            |

| Control (UI)     | Knob (Scripting) | Default Value | Function                              |
|------------------|------------------|---------------|---------------------------------------|
| Refraction Tab   |                  |               |                                       |
| refraction index | refraction_index | 1             | Changes the type of refraction.       |
| value            | refraction_value | 1             | Sets the intensity of the refraction. |

## Relight

The Relight node takes a 2D image containing normal and point position passes and lets you relight it using 3D lights. Essentially bypassing the need to return to a 3D application and re-render the lighting, Relight provides a quick and interactive way to relight a 3D scene in a 2D environment.

Relight works by applying a 3D shader to a 2D image using the normal and point position passes stored in separate image channels, and lets you attach and manipulate a 3D light (or multiple lights via a Scene node).

See also [Light](#), [Spot](#), [Point](#), [Direct](#), and [Environment](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | color           | <p>The 2D image to relight using 3D lights. This image should contain normal and point position passes.</p> <p>You can create normal and point position passes using the <a href="#">DepthGenerator</a> node in NukeX, for example.</p>                                                                                                                                                                                                  |
|                 | cam             | <p>The camera used to render the <b>color</b> image.</p> <div>  <p><b>Note:</b> The <b>cam</b> input only appears once the <b>lights</b> input has been connected to a light or scene node.</p> </div>                                                                                                                                                  |
|                 | lights          | <p>The light node to use to relight the <b>color</b> image. If you want to use multiple lights, you can also connect a Scene node here.</p>                                                                                                                                                                                                                                                                                              |
|                 | material        | <p>The 3D shader to apply to the <b>color</b> image. This can be a <a href="#">Phong</a> node, for example.</p> <p>Depending on the type of shader you attach, ensure that you've defined the necessary properties for it.</p> <div>  <p><b>Note:</b> The <b>material</b> input only appears once the <b>cam</b> input has been connected.</p> </div> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------|
| Relight Tab  |                  |               |                                                                                                                                    |
| use alpha    | use_alpha        | disabled      | When enabled, the alpha channel of the <b>color</b> image is used as a mask to limit the effects of Relight on the original scene. |
| normal       | normal           | none          | The channel from the <b>color</b> input that contains the                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                       |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------|
| vectors         |                  |               | normal pass.                                                                   |
| point positions | position         | none          | The channel from the <b>color</b> input that contains the point position pass. |
| ambient         | ambient          | 0             | Sets the global ambient light level for the scene.                             |

# ScanlineRender

When connected to a [Scene](#) node, the ScanlineRender node renders all the objects and lights connected to that scene from the perspective of the [Camera](#) connected to the **cam** input (or a default camera if no **cam** input exists). The rendered 2D image is then passed along to the next node in the compositing tree, and you can use the result as an input to other nodes in the script.

The ScanlineRender node also outputs deep data if there is a Deep node downstream.

See also [PrmanRender](#), [Scene](#), and [Camera](#)

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | obj/scn         | Either: <ul style="list-style-type: none"> <li>• A Scene node that is connected to the objects and lights you want to render, or</li> <li>• a 3D object or MergeGeo node.</li> </ul>                                             |
|                 | cam             | An optional camera input. The scene is rendered from the perspective of this camera. If the camera input is not connected, ScanlineRender uses a default camera positioned at the origin and facing in the negative Z direction. |
|                 | bg              | An optional background input. This can be used to composite a                                                                                                                                                                    |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                       |
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|                 |                 | <p>background image into the scene and to determine the output resolution. If not used, this defaults to <b>root.format</b> or <b>root.proxy_format</b> defined in the <b>ProjectSettings</b>.</p> <p>If this input contains a depth channel, ScanlineRender considers it when doing Z-buffer and Z-blending calculations.</p> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| ScanlineRender Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| transparency       | transparency     | enabled       | When enabled, objects appear transparent where their alphas are less than 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Z-buffer           | ztest_enabled    | enabled       | Enable or disable the Z-buffer which compares object Z-depth within a scene, assisting with occlusions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| filter             | filter           | Cubic         | <p>Select the filtering algorithm to use when remapping pixels from their original positions to new positions. This allows you to avoid problems with image quality, particularly in high contrast areas of the frame (where highly aliased, or jaggy, edges may appear if pixels are not filtered and retain their original values).</p> <ul style="list-style-type: none"> <li>• <b>Impulse</b> - remapped pixels carry their original values.</li> <li>• <b>Cubic</b> - remapped pixels receive some smoothing.</li> <li>• <b>Keys</b> - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Simon</b> - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).</li> <li>• <b>Rifman</b> - remapped pixels receive some</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|               |                  |               | <p>smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).</p> <ul style="list-style-type: none"> <li>• <b>Mitchell</b> - remapped pixels receive some smoothing, plus blurring to hide pixelation.</li> <li>• <b>Parzen</b> - remapped pixels receive the greatest smoothing of all filters.</li> <li>• <b>Notch</b> - remapped pixels receive flat smoothing (which tends to hide moire patterns).</li> <li>• <b>Lanczos4</b>, <b>Lanczos6</b>, and <b>Sinc4</b> - remapped pixels receive sharpening which can be useful for scaling down. <b>Lanczos4</b> provides the least sharpening and <b>Sinc4</b> the most.</li> <li>• <b>Nearest</b> - Fastest and crudest, sample the nearest texel from the appropriate mip map.</li> <li>• <b>Bilinear</b> - Remove blockiness, sample and interpolate the four nearest texels from the appropriate mipmap level.</li> <li>• <b>Trilinear</b> - Smooth interpolation of texture quality according to the distance, bilinearly interpolate between two closest mipmap levels.</li> <li>• <b>Anisotropic</b> - Highest quality filtering, gives a better result when shading surfaces with a high angle relative to the camera.</li> </ul> |
| antialiasing  | antialiasing     | none          | Sets the level of antialiasing to reduce any aliasing artifacts in the render. Choose from <b>none</b> , <b>low</b> , <b>medium</b> and <b>high</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Z-blend mode  | zblend_mode      | none          | Type of ramp to use to blend two surfaces within the <b>Z-blend range</b> of each other. Smooth looks better, but linear is provided for back-compatibility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Z-blend range | zblend_range     | 0.1           | Any two surfaces closer together than this distance on the Z axis are blended together to smooth the transition between intersecting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                  |                  |               | objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| projection mode  | projection_mode  | render camera | <p>The projection modes are:</p> <ul style="list-style-type: none"> <li>• <b>perspective</b> - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera.</li> <li>• <b>orthographic</b> - use orthographic projection (projection onto the projection plane using parallel rays).</li> <li>• <b>uv</b> - have every object render its UV space into the output format. You can use this option to cook out texture maps.</li> <li>• <b>spherical</b> - have the entire 360-degree world rendered as a spherical map. You can increase <b>tessellationmax</b> to increase the accuracy of object edges as they are warped out of line, but this takes longer to render.</li> <li>• <b>rendercamera</b> - use the projection type of the render camera.</li> </ul> |
| tessellation max | max_tessellation | 3             | <p>Limits recursive subdivision of polygons by a screen-space distance percentage.</p> <p>This control can be useful in the <b>spherical</b> projection mode, which sometimes distorts object edges. If you see such distortions, you can try increasing this value to tessellate (subdivide) polygons into smaller polygons. This produces more accurate object edges, but also takes longer to render.</p>                                                                                                                                                                                                                                                                                                                                                                                                            |
| overscan         | overscan         | 0             | <p>The maximum additional pixels to render beyond the left/right and top/bottom of the frame. Rendering pixels beyond the edges of the frame can be useful if subsequent nodes need to have access outside the frame. For example, a Blur node</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                 |                  |               | down the node tree may produce better results around the edges of the frame if overscan is used. Similarly, a subsequent LensDistortion node may require the use of overscan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ambient         | ambient          | 0             | Enter a value between 0 (black) and 1 (white) to change the global ambient color.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| MultiSample Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| samples         | samples          | 1             | Sets the number of samples to render per pixel, to produce motion blur and antialiasing. If you use this, in most cases you can turn off the antialiasing and filter controls on the <b>ScanlineRender</b> tab.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| shutter         | shutter          | 0.5           | Enter the number of frames the shutter stays open when motion blurring. For example, a value of 0.5 corresponds to half a frame.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| shutter offset  | shutteroffset    | start         | <p>This value controls how the shutter behaves with respect to the current frame value. It has four options:</p> <ul style="list-style-type: none"> <li>• <b>centred</b> - center the shutter around the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29,5 to 30,5.</li> <li>• <b>start</b> - open the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 30 to 31.</li> <li>• <b>end</b> - close the shutter at the current frame. For example, if you set the shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30.</li> <li>• <b>custom</b> - open the shutter at the time you specify. In the field next to the dropdown menu, enter a value (in frames) you want to add to the</li> </ul> |

| Control (UI)         | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                      |
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|                      |                     |               | current frame. To open the shutter before the current frame, enter a negative value. For example, a value of - 0.5 would open the shutter half a frame before the current frame.                                                                              |
| shuttercustom offset | shuttercustomoffset | 0             | If the <b>shutter offset</b> parameter is set to <b>custom</b> , this parameter is used to set the time that the shutter opens by adding it to the current frame. Values are in frames, so -0.5 would open the shutter half a frame before the current frame. |
| randomize time       | temporal_jitter     | 0             | Adds randomness to the distribution of samples in time so they don't produce regularly spaced images. The larger the value, the larger the time difference between the samples.                                                                               |
| sample diameter      | spacial_jitter      | 1             | The diameter of the circle that the samples for each pixel are placed in for antialiasing. The larger the value, the more pixels are jittered.                                                                                                                |
| focus diameter       | focal_jitter        | 0             | Randomly orbit the camera about a point at the <b>focal distance</b> in front of it for each sample to produce depth-of-field effects from multiple samples.                                                                                                  |
|                      |                     |               | <div>  <b>Note:</b> The <b>focal distance</b> is set in the Camera node's controls, in the <b>Projection</b> tab. </div>                                                   |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| stochastic samples   | stochastic_samples   | 0             | <p>Sets the number of samples, per pixel, to use in stochastic estimation (zero is disabled). Lower values result in faster renders, while higher values improve the quality of the final image.</p> <p>Stochastic sampling is based on Robert L. Cook's <i>Stochastic Sampling in Computer Graphics</i>, available in <i>ACM Transactions on Graphics</i>, Volume 6, Number 1, January 1996.</p> <div>  <b>Note:</b> It is recommended for motion blur that the <b>samples</b> control is adjusted. This also provides anti-aliasing by jittering the sample point. </div>                                                                                 |
| uniform distribution | uniform_distribution | disabled      | When enabled, use a uniform temporal distribution of scenes to sample. This generates more accurate results for stochastic multisampling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Shader Tab           |                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| motion vectors       | motion_vectors_type  | distance      | <p>Select how to render motion vectors:</p> <ul style="list-style-type: none"> <li>• <b>off</b> - do not render motion vectors.</li> <li>• <b>classic</b> - render motion vectors the classic (pre-Nuke 6.1) way. This option is only provided for backwards compatibility, and isn't always accurate.</li> <li>• <b>velocity</b> - store the velocity of every single pixel in the motion vector channels (pre-Nuke 7.0 way). This option is only provided for backwards compatibility. In order to have the same behavior as Nuke 6.3, set <b>samples</b> to 1.</li> <li>• <b>distance</b> - for every pixel, store the distance (in pixels) between samples in the motion vector channels. This is the recommended option that</li> </ul> |

| Control (UI)            | Knob (Scripting)        | Default Value | Function                                                                                                                                                                                                           |
|-------------------------|-------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                         |               | usually produces the best results. It also allows the <a href="#">VectorBlur</a> node to produce curved vector blur where interpolation between two frames is made according to a curve rather than linearly.      |
| motion vector channels  | MB_channel              | forward       | The channels the motion vectors are output to.<br><br>You can use the checkboxes on the right to select individual channels.                                                                                       |
| output vectors          | output_shader_vectors   | disabled      | When enabled, shader vectors ( <b>surface points</b> and <b>surface normals</b> ) are output as well as motion vectors. These can be useful if you want to relight the rendered 3D scene in the compositing phase. |
| surface points          | P_channel               | none          | The channel to use as the surface point channel. When <b>output vectors</b> is enabled, ScanlineRender outputs the surface point positions (in world space coordinates) into this channel.                         |
| surface normal          | N_channel               | none          | The channel to use as the surface normal channel. When <b>output vectors</b> is enabled, ScanlineRender outputs the surface point normals (in world space coordinates) into this channel.                          |
| Deep Tab                |                         |               |                                                                                                                                                                                                                    |
| drop zero alpha samples | drop_zero_alpha_samples | enabled       | When enabled, deep samples with an alpha value of 0 do not contribute to the output.<br><br>When disabled, deep samples with an alpha value 0 contribute to the output.                                            |

# Scene

Regardless of its location in your script, the Scene node is the highest-level node in the scene hierarchy because it references all the elements in a 3D workspace - all the geometric objects, cameras, and lights.

Every Scene node in a script should be connected to a [ScanlineRender](#), [RayRender](#), or [PrmanRender](#) node, which render the results of the scene.

## Inputs and Controls

| Connection Type | Connection Name   | Function                                                                                         |
|-----------------|-------------------|--------------------------------------------------------------------------------------------------|
| Input           | [numbered inputs] | 3D objects, Lights, Cameras, and materials. You can connect any number of nodes to a Scene node. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scene Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| display      | display          | unchanged     | <p>Adjust the display characteristics of the 3D objects attached to the node. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object geometry outlines.</li> <li>• <b>textured</b> - displays only the surface textures.</li> <li>• <b>textured + wireframe</b> - displays the wireframes plus the surface textures.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                           |
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|                |                  |               | <ul style="list-style-type: none"> <li>• <b>unchanged</b> - doesn't change object display modes.</li> </ul>                                                                                                        |
| selectable     | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                |
| render         | render_mode      | unchanged     | Sets how objects connected to the scene will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                     |
| shadow         | shadow_override  | unchanged     | Determines whether geometry nodes in the scene remain <b>unchanged</b> , or are adjusted to <b>override inputs</b> . If the latter option is chosen, you can set shadow options for all the geometry in the scene. |
| cast shadow    | cast_shadow      | disabled      | If the shadow operation is set to <b>override inputs</b> , <b>cast shadow</b> enables the geometry to cast shadows on other objects.                                                                               |
| receive shadow | receive_shadow   | disabled      | If the shadows operation is set to <b>override inputs</b> , <b>receive shadow</b> enables the geometry to have shadows cast on it by other objects, provided a materials shader has been attached to the object.   |

# Specular

The Specular node controls how bright and wide the highlights on a material seem. The location of the viewpoint is significant: the specular highlights are the brightest along the direct angle of reflection.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | mapsh           | An optional mask for varying the shininess value. Where the mask is black, the shininess is set to <b>min shininess</b> . Where the mask is white, the shininess is set to <b>max shininess</b> . Values in between (where the matte is gray) are attenuated accordingly.             |
|                 | map             | The image used to modulate the specular properties of the material.                                                                                                                                                                                                                   |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| Specular Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| channels      | channels         | rgba          | <p>The effect is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                 |
| white         | white            | 0.18          | The brightness of the specular highlight. The higher the value, the shinier the material seems.                                                                                                                                                                                                                                                                                                                                                                                    |
| min shininess | min_shininess    | 10            | <p>The shininess value controls the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> |



| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                   |                   |               | If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| max shininess     | max_shininess     | 10            | <p>The shininess value controls the width of the highlights. The higher the value, the wider the highlights.</p> <p>If you have connected a mask to the <b>mapSh</b> input of the node, pixel values in the mask are used to vary the shininess value. Where the matte is black, the shininess is set to <b>min shininess</b>. Where the matte is white, the shininess is set to <b>max shininess</b>. Values in between (where the matte is gray) are attenuated accordingly.</p> <p>If you're not using the <b>mapSh</b> input, the average of <b>min shininess</b> and the <b>maxshininess</b> value is used as the shininess value for the material.</p> |
| shininess channel | shininess_channel | luminance     | <p>Select which channel from the <b>mapSh</b> input is used to map the black and white values to the <b>minshininess</b> and <b>maxshininess</b> controls. Choose:</p> <ul style="list-style-type: none"> <li>• <b>red</b> to use the red channel for the mapping,</li> <li>• <b>green</b> to use the green channel,</li> <li>• <b>blue</b> to use the blue channel,</li> <li>• <b>alpha</b> to use the alpha channel,</li> <li>• <b>luminance</b> to use the luminance, or</li> <li>• <b>average rgb</b> to use the average of the red, green, and blue channels.</li> </ul>                                                                                |

# Sphere

The Sphere node creates an adjustable sphere in a 3D scene. You can map a texture on to the sphere by attaching an image to the **img** input.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | img             | The texture you want to project on to the object's face. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Sphere Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| display         | display          | textured      | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable      | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| render          | render_mode      | textured      | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| cast shadows    | cast_shadow      | enabled       | When enabled, the sphere object can cast shadows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| receive shadows | receive_shadow   | enabled       | When enabled, and a material shader has been added, the sphere object can have shadows cast onto it by other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | objects.                                                                                                                                                                                                                                                                                                                 |
| frame range  | frame_first      | 1             | Sets the start frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                    |
|              | frame_last       | 1             | Sets the end frame for the frame range displayed in the Viewer when the Timeline range is set to <b>Input</b> . This can be used to display the offset used in the TimeOffset node.                                                                                                                                      |
| rows/columns | rows             | 30            | Sets the number of rows on the outer face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                                |
|              | columns          | 30            | Sets the number of columns on the outer face of the object. The maximum value is 512, but high values may cause instability.                                                                                                                                                                                             |
| radius       | radius           | 1             | Sets the radius of the sphere.                                                                                                                                                                                                                                                                                           |
| u extent     | u_extent         | 360           | <p>Sets the extent to which the input image wraps around the sphere horizontally without extrapolating from the image edges.</p> <p>For example, a value of 180 wraps the input image 90° around the sphere on both sides of the y axis and closes any remainder by extrapolating from the edges of the input image.</p> |
| v extent     | v_extent         | 180           | <p>Sets the extent to which the input image wraps around the sphere vertically without extrapolating from the image edges.</p> <p>For example, a value of 90 wraps the input image 45° around the sphere on both sides of the x axis and closes any remainder by extrapolating from the edges of the input image.</p>    |
| close top    | close_top        | enabled       | When enabled, the top of the sphere is closed off.                                                                                                                                                                                                                                                                       |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| close bottom                                                                      | close_bottom     | enabled       | When enabled, the bottom of the sphere is closed off.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scale          | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale  | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew           | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| specify matrix | useMatrix        | N/A           | Enable this to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                     |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                   |

# Spot

Spot nodes create a point in 3D space that emits a cone-shaped light in a given direction. A real world example of a spot light is a desk lamp.

See also [Light](#), [Point](#), [Direct](#), [Environment](#), and [Relight](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                  |
|-----------------|-----------------|-------------------------------------------|
| Input           | unnamed         | An Axis, a Camera, or another Light node. |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spot Tab            |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| color               | color               | 1             | Sets the color of the light.                                                                                                                                                                                                                                                                                                                                                                                                                |
| intensity           | intensity           | 1             | Sets the brightness of the light.                                                                                                                                                                                                                                                                                                                                                                                                           |
| cone angle          | cone_angle          | 40            | Sets the spot light cone angle adjusting the spread of the light. Valid angles are from 0 to 180 degrees.                                                                                                                                                                                                                                                                                                                                   |
| cone penumbra angle | cone_penumbra_angle | 0             | Controls spot light softness along the edge of the area of illumination. A negative value fades inward from the circle's edge and vice versa. The cone falloff should be set to zero or a low amount in order to see the softness.                                                                                                                                                                                                          |
| cone falloff        | cone_falloff        | 0             | Sets how much the spot light diminishes from the center of the circular region out to the edge. The higher the value, the more focused the light. The falloff is independent of the falloff type                                                                                                                                                                                                                                            |
| falloff type        | falloff_type        | No falloff    | <p>Sets the amount of light the object gets from the light source, based on the distance between the light source and the object.</p> <ul style="list-style-type: none"> <li>• <b>No falloff</b> - light does not diminish with distance.</li> <li>• <b>Linear</b> - diminish the light at a fixed rate as it travels from the object.</li> <li>• <b>Quadratic</b> and <b>Cubic</b> - diminish the light at an exponential rate.</li> </ul> |
| display             | display             | wireframe     | Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these                                                                                                                                                                                                                                                                                                                      |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <p>are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+lines</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+lines</b> - displays the wireframe plus the surface texture.</li> </ul>                                                                   |
| selectable                                                                          | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|   | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                         |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                        |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| translate       | translate        | 0, 0, 0       | Lets you translate the object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the object in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| scale           | scaling          | 1, 1, 1       | Lets you scale the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| uniform scale   | uniform_scale    | 1             | Lets you scale the object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| skew            | skew             | 0, 0, 0       | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to a 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| specify matrix  | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                             |
| matrix          | matrix           | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.                                                                                                                                                                                                                                                                                                                                                                                                                        |



| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| World Matrix  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| matrix        | matrix           | N/A           | Displays the world or absolute xyz transform of the node in world coordinates.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|               |                  |               |  <b>Note:</b> Unlike the <b>Local matrix</b> , you can't adjust the <b>World matrix</b> manually.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Shadows Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| cast shadows  | cast_shadows     | disabled      | When enabled, the light casts shadow as defined by the <b>Shadow</b> controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| shadow mode   | shadow_mode      | solid         | <p>Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity:</p> <ul style="list-style-type: none"> <li>• <b>solid</b> - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender.</li> <li>• <b>clipped alpha</b> - objects that cast shadows are considered to be transparent if the object's alpha is below the light's clipping threshold control in the Shadows tab. This option is only relevant if you are using ScanlineRender to render your shadows.</li> <li>• <b>full alpha</b> - shadows are calculated based on how light is reduced when it passes through non-opaque occluders. This option is only relevant if you are using ScanlineRender to render your shadows.</li> </ul> |
| filter        | filter           | cubic         | Determines the type of filter that the <b>shadow mode</b> uses when it's set to <b>clipped alpha</b> or <b>full alpha</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| scene epsilon | scene_epsilon    | 0.001         | An offset that moves the sampling point away from the geometry surface, towards the light that is casting the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|---------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                     |               | <p>shadow. Increasing this value can reduce self-shadowing artifacts.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>full alpha</b>.</p>                                                                                                                                                                                                                                                 |
| samples      | samples             | 1             | <p>Sets the number of samples for the light when generating soft shadows. If soft shadows in your scene appear dotty or noisy, try increasing this value. The higher the value, the smoother the soft the shadows become.</p> <p>This only applies when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                           |
| sample width | sample_width        | 1             | <p>Sets the size of the light for soft shadows. This value determines the width of the soft area around the edge of a shadow. The higher the value, the larger the soft area.</p> <p>This control is <b>only</b> relevant if your shadows are generated using raytracing.</p>                                                                                                                                                                            |
| bias         | depthmap_bias       | 0.01          | <p>Sets the bias for the raytracing or shadow map. Increase this value if self shadowing artifacts appear in the image. This moves the surface sample point away from surface. Note, however, that if you increase the value too much, some shadows may start moving away from the base of the objects that cast them.</p> <p>This only applies when <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                              |
| slope bias   | depthmap_slope_bias | 0.001         | <p>Bias for the shadow map. This is like <b>bias</b>, but the offset is proportional to the slope of the depth map. This allows you to give a different offset to each value in the depth map, depending on the surface's slope relative to the light.</p> <p>If increasing <b>bias</b> reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring <b>bias</b> down a little and</p> |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                     |               | <p>increase <b>slope bias</b> instead.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                      |
| clipping threshold  | clipping_threshold  | 0.5           | <p>Objects that are set to cast shadows are considered solid if their alpha is below the value set here.</p> <p>This only applies if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>clipped alpha</b>.</p>                                                                                                                                                                                                                                                                                                                                                    |
| jitter scale        | shadow_jitter_scale | 3             | <p>Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger <b>jitter scale</b> value results in softer, more perceptually accurate shadows.</p> <p>PCF works by sampling the depth map at many different positions around the same spot. The final shadow value for that spot is an average of how many of the samples were occluded or visible from point of view of the light.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p> |
| depthmap resolution | depthmap_width      | 1024          | <p>Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process.</p> <p>Note that you can also fix crunchy edges by increasing the number of <b>samples</b> instead of increasing the depth map resolution.</p> <p>This control is only relevant if your shadows are generated using depth mapping and <b>shadow mode</b> is set to <b>solid</b> or <b>clipped alpha</b>.</p>                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| output mask  | shadow_mask      | disabled      | Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .      |
|              |                  | none          | Sets the channel you want to output the shadow map into. This can be enabled even if the <b>cast shadows</b> box is disabled. |

# TransformGeo

The TransformGeo node lets you translate, rotate, scale, and skew 3D geometry objects.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to translate, rotate, scale, or skew. If you want to transform several objects together, you can also connect a <a href="#">MergeGeo</a> node here.                                                                                                                                                                                                                                                                                                                                                                                      |
|                 | look            | <p>An optional input where you can connect a Camera or 3D object that the transformed 3D object should face. If a <b>look</b> input exists, the transformed 3D object is automatically rotated to point towards the <b>look</b> input whenever the <b>look</b> input is moved.</p> <p>This can be useful, for example, if you have a 2D matte painting mapped to a Card in your scene. The <b>look</b> input ensures that the plane of the painting always faces the camera, regardless of the camera position, and maintains the illusion depicted by the painting.</p> |
|                 | axis            | An optional Axis node input. This links the position, rotation, scale, and skew of the transformed 3D object(s) to the Axis node, so that the transformation controls on the Axis node override the corresponding                                                                                                                                                                                                                                                                                                                                                        |

| Connection Type | Connection Name | Function                                                                                                                                           |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | controls on the TransformGeo node.<br><br>If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object. |

| Control (UI)                                                                        | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TransformGeo Tab                                                                    |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| display                                                                             | display           | unchanged     | Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable                                                                          | selectable        | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| render                                                                              | render_mode       | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| transform normals                                                                   | transform_normals | disabled      | When enabled, transforms normals in the rendered output. In most cases this control should be left disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | file_menu         | N/A           | Select to import or export a channel file: <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>the input object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the input object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the object is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                 |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                     |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0,0,0         | Lets you translate the 3D object along the x, y, and z axes. you can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                |
| rotate                                                                            | rotate           | 0,0,0         | Lets you rotate the 3D object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                               |
| scale                                                                             | scale            | 1,1,1         | Lets you scale the 3D object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the 3D object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew           | skew             | 0,0,0         | Lets you skew the object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| pivot          | pivot            | 0,0,0         | <p>When you make changes to the 3D object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Specify Matrix | useMatrix        | disabled      | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                       |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>Specify Matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                             |
| Look Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Look Axis      | look_axis        | +Z            | The axis around which the 3D object is rotated to face the <b>look</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Rotate X       | rotate_x         | on            | Determines whether the rotation occurs around the X axis. Note that for the rotation to truly "look at" the <b>look</b> input, all three of these options must be activated.                                                                                                                                                                                                                                                                                                                                      |
| Rotate Y       | rotate_y         | on            | Determines whether the rotation occurs around the Y axis. Note that for the rotation to truly "look at" the <b>look</b> input, you have to set all three of these options.                                                                                                                                                                                                                                                                                                                                        |
| Rotate Z       | rotate_z         | on            | Determines whether the rotation occurs around the Z axis. Note that for the rotation to truly "look at" the <b>look</b>                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                    |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | input, you have to set all three of these options.                                                                                                                          |
| Look Strength   | look_strength    | 1             | Determines to what extent the 3D object rotates to the new orientation. The smaller the value, the less the object is rotated. Setting the value to 0 produces no rotation. |
| Use Quaternions | use_quaternions  | off           | Uses an alternate scheme to calculate the <b>look</b> rotation. This option may be useful to smooth out erratic rotations along the look axis.                              |

# Transmission

The Transmission node allows you to render semi-transparent, colored shadows by simulating the absorption of light passing through a surface. The Transmission shader must be used in conjunction with lights that cast full alpha shadows.



**Note:** The Transmission node only works if your 3D scene contains a light that casts full alpha shadows and is rendered using RayRender.

See also [RayRender](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | map             | An optional mask for limiting the effect. Any changes you make to the shadows are limited to the non-black areas of the mask.                                                                                                                                                         |
|                 | unnamed         | Either: <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |



| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmission Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| transmittance    | transmittance    | 0.18          | When <b>absorption mode</b> is set to <b>constant</b> , controls how much light passes through from the texture image. 0 is equal to no light passing through and 1 is all light passing through.                                                                                                                                                                                                                                                                                                              |
| intensity        | intensity        | 1             | Controls the intensity of the light passed through by modulating the material's absorption.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| absorption mode  | absorption_mode  | constant      | Sets the absorption mode used to calculate the shadow: <ul style="list-style-type: none"> <li>• <b>constant</b> - uses the <b>transmittance</b> control to set the amount of absorption.</li> <li>• <b>solid</b> - uses the solid component of the input material to set the amount of absorption.</li> <li>• <b>diffuse</b> - uses the diffuse component of the input material to set the amount of absorption.</li> <li>• <b>map</b> - uses the <b>map</b> input to set the amount of absorption.</li> </ul> |

# Trilinear

The Trilinear node lets you warp your 3D geometry object as a whole by using trilinear interpolation from the object's bounding box to the given destination box. For example, you can use this node to create animated object deformations, such as the squash of a bouncing ball.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                          |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The 3D geometry object you want to warp. If you want to warp several objects together, you can also connect a <a href="#">MergeGeo</a> node here. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trilinear Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| display              | display          | unchanged     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable           | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| render               | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| reset shape to input | reset_shape      | N/A           | Cancels your changes and resets the input to its original shape.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| copy                 | copy_shape       | N/A           | Copies the current positions of the bounding box corners ( <b>p0-p7</b> ) into a temporary buffer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| paste                | paste_shape      | N/A           | Pastes previously copied positions of the bounding box corners ( <b>p0-p7</b> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| set key              | set_key_shape    | N/A           | Sets keys for the positions of all the bounding box corners ( <b>p0-p7</b> ) on the current frame. This is the same as selecting <b>Setkey</b> from the animation menu next to each of the controls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI)   | Knob (Scripting) | Default Value    | Function                                                                                                                                  |
|----------------|------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| delete key     | del_key_shape    | N/A              | Deletes the keys on the positions of all the bounding box corners ( <b>p0-p7</b> ) on the current frame.                                  |
| delete anim    | del_anim_shape   | N/A              | Deletes the keys on the positions of all the bounding box corners ( <b>p0-p7</b> ) on all frames.                                         |
| p0 xyz         | p0               | -0.5, -0.5, -0.5 | The x, y, and z coordinates for the <b>p0</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p1 xyz         | p1               | -0.5, 0.5, -0.5  | The x, y, and z coordinates for the <b>p1</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p2 xyz         | p2               | 0.5, 0.5, -0.5   | The x, y, and z coordinates for the <b>p2</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p3 xyz         | p3               | 0.5, -0.5, -0.5  | The x, y, and z coordinates for the <b>p3</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p4 xyz         | p4               | -0.5, -0.5, 0.5  | The x, y, and z coordinates for the <b>p4</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p5 xyz         | p5               | -0.5, 0.5, 0.5   | The x, y, and z coordinates for the <b>p5</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p6 xyz         | p6               | 0.5, 0.5, 0.5    | The x, y, and z coordinates for the <b>p6</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| p7 xyz         | p7               | 0.5, -0.5, 0.5   | The x, y, and z coordinates for the <b>p7</b> corner of the bounding box. You can also adjust these by dragging the corner in the Viewer. |
| Source box Tab |                  |                  |                                                                                                                                           |
| use incoming   | src_use_bbox     | enabled          | By default, the node warps the bounding box of the input                                                                                  |

| Control (UI)              | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                                                  |
|---------------------------|------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| bounding box              |                  |                  | object. If you'd rather warp a custom bounding box, uncheck this and use the controls below to define the custom box.                                                                                                     |
| reset source box to input | reset_src_shape  | N/A              | <p>Cancels any changes you've made to the custom bounding box and resets it to the original settings taken from the input.</p> <p>This control is only available if you have unchecked <b>useincomingboundingbox</b>.</p> |
| box                       | src_color        | red              | <p>The color of the custom bounding box in the 3D Viewer.</p> <p>This control is only available if you have unchecked <b>useincomingboundingbox</b>.</p>                                                                  |
| src0 xyz                  | src0             | -0.5, -0.5, -0.5 | Sets the x, y, and z coordinates for one of the two custom bounding box corners you can adjust.                                                                                                                           |
| src1 xyz                  | src1             | 0.5, 0.5, 0.5    | Sets the x, y, and z coordinates for one of the two custom bounding box corners you can adjust.                                                                                                                           |

# UVProject

The UVProject node sets the UV coordinates for an object, allowing you to project a texture image onto the object. If the object already has UV coordinates, this node replaces them.

See also [Project3D](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                       |
|-----------------|-----------------|----------------------------------------------------------------|
| Input           | axis/cam        | The Axis or Camera node controlling the projection attributes. |
|                 | unnamed         | The 3D object onto which the texture is projected.             |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UVProject Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display       | display          | unchanged     | <p>Adjust the display characteristics of the 3D object. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - doesn't display geometry outlines.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid + wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured + wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the object's display mode. The Viewer can override this setting.</li> </ul> |
| selectable    | selectable       | enabled       | When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| render        | render_mode      | unchanged     | Sets how the object will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| projection           | projection_mode  | perspective   | <p>Sets the projection type for rendered objects. Usually, it's best to select a type that's close to the object's surface shape.</p> <ul style="list-style-type: none"> <li>• off</li> <li>• perspective</li> <li>• planar</li> <li>• spherical</li> <li>• cylindrical</li> </ul> <div>  <b>Note:</b> When <b>projection</b> is set to <b>off</b>, the UVProject node is essentially disabled. </div> |
| plane                | plane            | XY            | <p>Sets the projection direction to project the texture image along the x, y, or z axis.</p> <div>  <b>Note:</b> This dropdown menu is only available if you selected <b>planar</b> as the projection type. </div>                                                                                                                                                                                   |
| project on           | project_on       | both          | <p>Sets which surfaces of a 3D object the projection falls on through the camera:</p> <ul style="list-style-type: none"> <li>• both</li> <li>• front</li> <li>• back</li> </ul>                                                                                                                                                                                                                                                                                                         |
| view frustum culling | frustum_culling  | disabled      | <p>When enabled, the UVProject node affects only the vertices inside the camera view frustum. Any vertices outside the view frustum will not be affected and they still keep their original uv coordinates.</p>                                                                                                                                                                                                                                                                         |
| invert u             | u_invert         | disabled      | <p>When enabled, the u coordinates are inverted on the horizontal axis.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| invert v             | v_invert         | disabled      | <p>When enabled, the v coordinates are inverted on the vertical axis.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                           |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| u scale      | u_scale          | 1             | Stretches or squashes the texture on the horizontal axis.                                                                                                                                                          |
| v scale      | v_scale          | 1             | Stretches or squashes the texture on the vertical axis.                                                                                                                                                            |
| attrib name  | uv_attrib_name   | uv            | Specifies the name of the attribute to use for the UV coordinates of the upstream geometry. If your geometry has more than one set of UV coordinates, you can choose the attribute that suits the projection type. |

# UVTile

When projecting textures onto an object, use the UVTile node to modify the coordinates of a given UV (or UDIM) patch and adjust the behavior of individual patches.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                    |
|-----------------|-----------------|---------------------------------------------------------------------------------------------|
| Input           | unnamed         | The Read node with the UV (or UDIM) patch whose coordinates or behavior you want to adjust. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UVTile Tab   |                  |               |                                                                                                                                                                                                                                                                                                                                                   |
| udim         | udim             | 1001          | <p>The patch's UDIM coordinates. Enter an alternative UDIM value here to offset the given patch to that point. Check <b>enable</b> to adjust the value here.</p> <p>UDIM is a numbering scheme that identifies the first texture that's applied to the (0,0) - (1,1) region as 1001, with numbers increasing by one for each texture in the U</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                     |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | direction, and by ten for each texture in the V direction.                                                                                                                                                                                                                                                                                   |
| enable       | udim_enable      | disabled      | Check to enable the UDIM numbering scheme. Checking this disables the <b>u</b> and <b>v</b> fields.                                                                                                                                                                                                                                          |
| u            | tile_u           | 0             | The patch's u coordinate in UV space. Enter a value here to offset the given patch to that point.                                                                                                                                                                                                                                            |
| v            | tile_v           | 0             | The patch's v coordinate in UV space. Enter a value here to offset the given patch to that point.                                                                                                                                                                                                                                            |
| wrap mode    | wrap_u           | clamp         | Sets how existing patches are used to fill in the areas on the u axis where unique textures are not present: <ul style="list-style-type: none"> <li>• <b>clamp</b> - Patch edges are stretched indefinitely.</li> <li>• <b>repeat</b> - Patches are tiled repeatedly.</li> <li>• <b>mirror</b> - Patches are mirrored repeatedly.</li> </ul> |
|              | wrap_v           | clamp         | Sets how existing patches are used to fill in the areas on the v axis where unique textures are not present: <ul style="list-style-type: none"> <li>• <b>clamp</b> - Patch edges are stretched indefinitely.</li> <li>• <b>repeat</b> - Patches are tiled repeatedly.</li> <li>• <b>mirror</b> - Patches are mirrored repeatedly.</li> </ul> |
| translate    | translate        | 0, 0          | Translates the entire UV grid map on the x and y axes.                                                                                                                                                                                                                                                                                       |
| scale        | scale            | 1             | Scales the width and height of the UV grid map.                                                                                                                                                                                                                                                                                              |

# Wireframe

The Wireframe node allows you to render a wireframe overlay on the surface of your geometry object.



**Note:** The Wireframe node only works if you are rendering your 3D scene using ScanlineRender.



## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                     |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>Either:</p> <ul style="list-style-type: none"> <li>• The 2D image you're using for the surface texture, or</li> <li>• Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.</li> </ul> |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wireframe Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| channels      | channels         | rgba          | <p>The effect is only applied to these channels.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| operation     | operation        | opaque        | <p>Sets how the wireframe overlay is applied to the geometry:</p> <ul style="list-style-type: none"> <li>• <b>opaque</b> - display the wireframe on fully opaque black input geometry.</li> <li>• <b>see through</b> - display the wireframe on fully transparent geometry.</li> <li>• <b>over</b> - display the wireframe on top of the input shader or texture.</li> <li>• <b>multiply</b> - multiply the wireframe by the input shader or texture and display it on fully transparent geometry.</li> <li>• <b>modulate</b> - apply standard diffuse shading to the wireframe and display it on top of the input shader or texture. This takes into account any lights in the scene.</li> </ul> |
| line width    | line_width       | 0.5           | Sets the width of the wireframe lines (in pixels).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| line color    | line_color       | 1             | Sets the color and transparency of the wireframe lines.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# WriteGeo

Writes out geometry to a specified file. You can export:

- OBJ files
- FBX files containing meshes, point clouds, cameras, lights, and axes.
- Alembic (.abc) files containing meshes, point clouds, cameras, or axes. For more information on Alembic, see <http://code.google.com/p/alembic/>.

You can write the geometry by clicking the **Execute** button and specifying a range of frames you want written or by running the Nuke script with the **-x** switch.

See also [ReadGeo](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                         |
|-----------------|-----------------|------------------------------------------------------------------|
| Input           | unnamed         | The geometry or scene you want to write out to a specified file. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                             |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------|
| WriteGeo Tab   |                  |               |                                                                                                      |
| file           | file             | none          | Enter the file path and file name or use the folder icon to browse to the required location.         |
| Execute        | Execute          | N/A           | Click to write the input geometry to the file specified in the <b>file</b> control.                  |
| frame range    | first            | 1             | When <b>limit to range</b> is enabled, enter the first frame to write to the specified <b>file</b> . |
|                | last             | 1             | When <b>limit to range</b> is enabled, enter the last frame to write to the specified <b>file</b> .  |
| limit to range | use_limit        | disabled      | When enabled, enter the first and last frames to                                                     |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | write to the specified <b>file</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| views                                                                               | views            | main          | When you're working with stereo footage, select the required view.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| file type                                                                           | file_type        | none          | <p>Select the file type you intend to write:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - Nuke attempts to guess the <b>file type</b> from the <b>file</b> name, but you cannot set any type-specific controls.</li> <li>• <b>abc</b> - when the WriteGeo node is connected to a Scene node, writes to an <b>.abc</b> file and exposes the Alembic-specific controls (see <b>abc Options</b>).</li> <li>• <b>fbx</b> - when the WriteGeo node is connected to a Scene node, writes to an <b>.fbx</b> file and exposes the FBX-specific controls (see <b>fbx Options</b>).</li> <li>• <b>obj</b> - write to an <b>.obj</b> file.</li> </ul> |
| abc Options (These controls are only exposed when file type is set to <b>abc</b> .) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| geometries                                                                          | writeGeometries  | enabled       | When enabled, write the scene geometries into the <b>.abc</b> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pointClouds                                                                         | writePointClouds | enabled       | When enabled, write the scene point clouds into the <b>.abc</b> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| cameras                                                                             | writeCameras     | enabled       | When enabled, write the scene cameras to the <b>.abc</b> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| axes                                                                                | writeAxes        | enabled       | When enabled, write the scene axes into the <b>.abc</b> file.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| storage format                                                                      | storageFormat    | HDF           | <p>Select the storage format to use when writing the file:</p> <ul style="list-style-type: none"> <li>• <b>HDF</b> - A storage format that maintains backwards compatibility.</li> <li>• <b>Ogawa</b> - A storage format that offers faster file reading and smaller files.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                   |
| fbx Options (These controls are only exposed when file type is set to <b>fbx</b> .) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)                                                                                                                                           | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| geometries                                                                                                                                             | writeGeometries     | enabled       | When enabled, write the scene geometries into the <b>.fbx</b> file.                                                                                                                                                                           |
| cameras                                                                                                                                                | writeCameras        | enabled       | When enabled, write the scene cameras to the <b>.fbx</b> file.                                                                                                                                                                                |
| lights                                                                                                                                                 | writeLights         | enabled       | When enabled, write the scene lights into the <b>.fbx</b> file.                                                                                                                                                                               |
| axes                                                                                                                                                   | writeAxes           | enabled       | When enabled, write the scene axes into the <b>.fbx</b> file.                                                                                                                                                                                 |
| point clouds                                                                                                                                           | writePointClouds    | enabled       | When enabled, write the scene point clouds into the <b>.fbx</b> file.                                                                                                                                                                         |
| ascii file format                                                                                                                                      | asciiFileFormat     | disabled      | When disabled, a binary .fbx file is written. Check <b>ascii file format</b> to write the scene as an ascii .fbx file.                                                                                                                        |
| animate mesh vertices                                                                                                                                  | animateMeshVertices | disabled      | When enabled, the mesh vertices are animated and keyframes created at every frame. The animated meshes use vertex point cache for the data and a directory with <b>_fpc</b> appended to the file name is created to contain the point caches. |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                     |               |                                                                                                                                                                                                                                               |
| before render                                                                                                                                          | beforeRender        | none          | These functions run prior to starting rendering in <code>execute()</code> . If they throw an exception, the render aborts.                                                                                                                    |
| before each frame                                                                                                                                      | beforeFrameRender   | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                      |
| after each frame                                                                                                                                       | afterFrameRender    | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.                                                                                          |
| after render                                                                                                                                           | afterRender         | none          | These functions run after rendering of all frames is                                                                                                                                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                               |
|-----------------|------------------|---------------|------------------------------------------------------------------------|
|                 |                  |               | finished. If they throw an error, the render aborts.                   |
| render progress | renderProgress   | none          | These functions run during rendering to determine progress or failure. |

# Particles Nodes

Particles nodes (NukeX and Nuke Studio only) deal with Nuke's built-in particle system, often used for creating effects like fog, smoke, rain, snow, and explosions.

## ParticleBlinkScript

The ParticleBlinkScript node is similar to the BlinkScript node, running Foundry's Blink framework it enables us to write our code once and run it on any supported device. This is achieved through code translation, in which the Blink code is turned into specific code for each target device.

Unlike the BlinkScript node which works on images, the ParticleBlinkScript node works on a particle system. It's a ParticleOp which lets you write a Blink kernel to modify the particles, allowing custom behavior that can't be achieved with Nuke's built in particle nodes.

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                 |
|-----------------|-----------------|--------------------------------------------------------------------------|
| Input           | particles       | The source particles to which the ParticleBlinkScript kernel is applied. |

### Properties - BlinkScript Tab

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------|
| display      | display          | unchanged     | Adjust the display characteristics of the 3D object. These settings don't affect the |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul>                                   |
| selectable   | selectable       | enabled       | <p>When enabled, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| render       | render_mode      | unchanged     | <p>Sets how the object is rendered. This control is independent from the display selection, but has the same settings.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the 3D geometry object.</li> <li>• <b>wireframe</b> - displays only the outlines of the object's geometry.</li> <li>• <b>solid</b> - displays all geometry with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the geometry as solid color with the object's geometry outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| Kernel File  | kernelFile       | none          | <p>Sets the file path of the kernel used for <b>Load</b> and <b>Save</b> operations. BlinkScript</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)         | Knob (Scripting)            | Default Value | Function                                                                                                                                                                         |
|----------------------|-----------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                             |               | kernels use the <b>.rpp</b> file extension.                                                                                                                                      |
| Load                 | loadKernelFile              | N/A           | Click to load and compile the kernel specified in the <b>Kernel File</b> field.                                                                                                  |
| Save                 | saveKernelFile              | N/A           | Click to save the current kernel to the location and file name specified in the <b>Kernel File</b> field.                                                                        |
| <b>Kernel Source</b> |                             |               |                                                                                                                                                                                  |
| Kernel Editor        | kernelSource                | ParticleDrag  | <p>Enter the kernel you intend to compile or edit the default ParticleDrag to suit your purposes.</p> <p>Click the <b>Recompile</b> button to see the result of any changes.</p> |
| Recompile            | recompile                   | N/A           | Click to recompile the kernel currently in the Kernel Editor. Any compile errors present are displayed on screen.                                                                |
| Create Knobs         | createKnobs                 | N/A           | Click to create knobs for any parameters which don't already have one.                                                                                                           |
| Publish              | publish                     | N/A           | Click to create a group containing a copy of the current node. This can then be saved as a Gizmo if desired.                                                                     |
| Protect Kernel       | protectKernelWhenPublishing | disabled      | When enabled, the kernel in the published group will be encoded and will not be readable when the published node is written to a script.                                         |



## Properties - Conditions Tab

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| probability  | probability      | 1             | <p>This defines the probability that any given particle is affected by this node.</p> <p>For each incoming particle, the op generates a random number between 0 and 1. If the number is greater than the defined <b>probability</b> value, then that particle is ignored and left unchanged.</p> <p><b>0.0</b> - No particles are ever affected.</p> <p><b>1.0</b> - Every particle is affected</p> |
| min age      | min_age          | 0             | <p>Define the minimum required age of a particle for it to be affected by this node. This node only applies to particles which are above this age, where the age is normalized to <b>0-1</b>.</p>                                                                                                                                                                                                   |
| max age      | max_age          | 1             | <p>Define the maximum required age of a particle for it to be affected by this node. This node only applies to particles which are below this age, where the age is normalized to <b>0-1</b>.</p>                                                                                                                                                                                                   |
| random seed  | seed             | 0             | <p>Altering this value produces different results for anything that requires random numbers. It is used in particular for <b>probability</b> but can also be used for the <b>range</b> knobs within a <b>ParticleEmitter</b>.</p>                                                                                                                                                                   |
| channels     | channels         | all           | <p>Select which channels to apply this force to.</p> <p>Particles can be emitted on one or more channels, only selected channels will have this force applied to them.</p>                                                                                                                                                                                                                          |

## Properties - Region Tab

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region are affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                      |
| invert region                                                                       | region_invert    | disabled      | <p>If enabled, particles outside the <b>region</b> are affected, rather than those inside it.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                  |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| transform order     | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order      | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate           | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate              | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale               | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale       | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew                | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot               | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| <b>Local Matrix</b> |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix      | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix              | matrix           | N/A           | The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                               |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene. |

# ParticleBounce

With ParticleBounce, you can make your particles appear to bounce off a 3D shape instead of traveling through it. Use the ParticleBounce **object** control in combination with real geometry to make it look as though the particles are interacting with it. Each particle checks for intersection with the geometry, then bounces according to the normal at that point. This is currently limited to the primitive Nuke shapes plane, sphere, and cylinder.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                         |
|-----------------|-----------------|----------------------------------------------------------------------------------|
| Input           | geometry        | The geometry to bounce particles off when <b>object</b> is set to <b>input</b> . |
|                 | particles       | The particle system you intend to affect.                                        |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                               |
|--------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleBounce Tab |                  |               |                                                                                                                                                                                                                                                                                                                                        |
| display            | display          | unchanged     | Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> </ul> |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <ul style="list-style-type: none"> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable           | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                               |
| render               | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                               |
| external bounce mode | out_bounce_mode  | bounce        | Controls particle behavior when a bounce is detected on the external surface of the bounce object: <ul style="list-style-type: none"> <li>• <b>none</b> - nothing happens and the particle moves as normal.</li> <li>• <b>bounce</b> - the particle bounces off the surface.</li> <li>• <b>kill</b> - the particle is deleted.</li> </ul>                                                                                                                                                   |
| new channels         | out_new_channels | none          | Sets the channel where a particle should be assigned to when an external bounce is detected.                                                                                                                                                                                                                                                                                                                                                                                                |
| bounce               | out_bounce       | 1             | Sets the strength of the bounce effect. Higher values cause the bounce angle to be closer to the normal, and vice versa.                                                                                                                                                                                                                                                                                                                                                                    |
| friction             | out_friction     | 0             | Controls the slow down of particles as they hit the external surface at an angle to the normal. Higher values cause a backspin effect - the bounce angle becomes closer to the normal, and vice versa.                                                                                                                                                                                                                                                                                      |
| internal bounce mode | in_bounce_mode   | bounce        | Controls particle behavior when a bounce is detected on the internal surface of the bounce object:                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI)                                                                        | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                      |               | <ul style="list-style-type: none"> <li>• <b>none</b> - nothing happens and the particle moves as normal.</li> <li>• <b>bounce</b> - the particle bounces off the surface.</li> <li>• <b>kill</b> - the particle is deleted.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                            |
| new channels                                                                        | in_new_channels      | none          | Sets the channel where a particle should be assigned to when an internal bounce is detected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| bounce                                                                              | in_bounce            | 1             | Sets the strength of the bounce effect. Higher values cause the bounce angle to be closer to the normal, and vice versa.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| friction                                                                            | in_friction          | 0             | Controls the slow down of particles as they hit the internal surface at an angle to the normal. Higher values cause a backspin effect - the bounce angle becomes closer to the normal, and vice versa.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| object                                                                              | object               | plane         | Sets the geometry used to simulate bounce. Selecting <b>plane</b> , <b>sphere</b> , or <b>cylinder</b> uses Nuke standard primitives, but you can select <b>input</b> to use custom geometry attached to the <b>geometry</b> input.                                                                                                                                                                                                                                                                                                                                                                                                                               |
|  | bounceaxis_file_menu | N/A           | <p>Allows you to to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the bounce object according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the bounce object as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | bounceaxis_snap_menu | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the bounce object is snapped to a new position depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)    | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                          |               | <ul style="list-style-type: none"> <li>• <b>Match selection position, orientation</b> - the bounce object is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the bounce object is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                   |
| transform order | bounceaxis_xform_order   | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                              |
| rotation order  | bounceaxis_rot_order     | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | bounceaxis_translate     | 0, 0, 0       | Lets you translate the bounce object along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                     |
| rotate          | bounceaxis_rotate        | 0, 0, 0       | Lets you rotate the bounce object around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                    |
| scale           | bounceaxis_scaling       | 1, 1, 1       | Lets you scale the bounce object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | bounceaxis_uniform_scale | 1             | Lets you scale the bounce object simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | bounceaxis_skew          | 0, 0, 0       | Lets you skew the bounce object on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | bounceaxis_pivot         | 0, 0, 0       | <p>When you make changes to the bounce object's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the</p> |

| Control (UI)   | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|-------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                   |               | pivot point to a new location in the 3D Viewer.                                                                                                                                                                                                                                       |
| Local Matrix   |                   |               |                                                                                                                                                                                                                                                                                       |
| specify matrix | useMatrix         | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | bounceaxis_matrix | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |
| Conditions Tab |                   |               |                                                                                                                                                                                                                                                                                       |
| probability    |                   |               | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                 |
| min age        |                   |               | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                               |
| max age        |                   |               | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                               |
| random seed    |                   |               | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                 |
| channels       |                   |               | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different                                                                                                |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation,</li> </ul>                                                                                                                                                                                             |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | and size depending on the points selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticleCache

The ParticleCache node allows you to store the geometry simulation for a particle system to file. It can then be read back in different sessions of Nuke or on different machines without the need for recalculation.

This allows a particle system to be produced by an artist and then used by a render farm without recalculation, speeding up render times.

Caching does not replace the particle system rendered, as it relies on its inputs.



**Note:** ParticleCache nodes must be placed at the bottom of a single particle system or multiple merged particle systems. They cannot be placed beneath a Scene node connected to two separate streams or in the middle of a string of particle nodes.

## Inputs and Controls

| Connection Type | Connection Name | Function                                          |
|-----------------|-----------------|---------------------------------------------------|
| Input           | particles       | The particle system you intend to write to cache. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------|
| Cache Tab    |                  |               |                                                                                          |
| file         | file             | none          | Sets the file path to save the particle system to using the <b>.nkpc</b> file extension. |

| Control (UI)                                                                                                                                           | Knob (Scripting)              | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                               |               |  <b>Note:</b> ParticleCache may need to render up to 100 sub-frames. To account for this, it adds decimals to the file name's frame number. For example, if the file name in the <b>file</b> field is <b>particle_cache.####.nkpc</b> , ParticleCache may generate files called <b>particle_cache.0001.01.nkpc</b> , <b>particle_cache.0001.02.nkpc</b> , and so on. |
| padding                                                                                                                                                | particle_cache_padding        | 1             | <p>The number of extra frames added to the start and end of the ParticleCache render. This is required if you have nodes downstream requesting frames outside the normal frame range due to motion blur (for example, if you have increased the <b>shutter</b> value in a downstream ScanlineRender node).</p> <p>If you get a "Particle cache data not found" error when you enable <b>read from file</b>, you need to increase this value.</p>      |
| Render                                                                                                                                                 | Render                        | N/A           | Click to render the particle system to the location specified in the <b>file</b> control.                                                                                                                                                                                                                                                                                                                                                             |
| read from file                                                                                                                                         | particle_cache_read_from_file | disabled      | <p>When enabled, use the particle system rendered to the location specified in the <b>file</b> control.</p> <p>When disabled, re-evaluate the particle system as normal.</p>                                                                                                                                                                                                                                                                          |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                               |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| before render                                                                                                                                          | beforeRender                  | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                                                                                                                                                                          |
| before each frame                                                                                                                                      | beforeFrameRender             | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                                                                                                                                                                                                                              |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |

# ParticleCurve

With ParticleCurve, you can apply a curve to particle properties (such as size or mass) to change them over time. You can, for instance, adjust the curve for your particles' alpha channel so that each particle fades to invisibility toward the end of its lifetime.



**Note:** To use the ParticleCurve with RGBA values, you need to apply a BlendMat node to the texture, and set the surface blend knob to modulate. See [BlendMat](#) for more information. This is because the ParticleCurve node edits the particle vertex color, which only works when there is no particle input. By adding a texture or shape as the particle input, this overrides the particle vertex color and uses the particle input instead. The **modulate** value in the BlendMat node multiplies the particle's texture by the vertex color, allowing them to work together.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply the curve. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleCurve Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display           | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable        | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render            | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| curve editor      | curves           | N/A           | <p>Specifies the curves to apply to particles each frame. The x-axis is the particle's age (expressed as a proportion of its maximum lifetime, so 0.0 is a new particle and 1.0 is a particle about to expire).</p> <div>  <p><b>Note:</b> Changes in the curve editor are limited by the <b>Apply curve to</b> checkboxes. For example, changing the <b>size</b> curve has no effect if <b>size</b> is not checked under <b>Apply curve to</b>.</p> </div>                                                                                                                                                                                                                                                   |
| reset             | N/A              | N/A           | Click to reset all curves to their original values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Apply curve to:   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| rgb               | affect_rgb       | enabled       | When enabled, changes to the curves are applied in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | red, green, and blue channels.                                                                                                                                                                                                                                                                                            |
| alpha          | affect_alpha     | enabled       | When enabled, changes to the curves are applied in the alpha channel.                                                                                                                                                                                                                                                     |
| size           | affect_size      | disabled      | When enabled, changes to the curves are applied to the size of the particles.                                                                                                                                                                                                                                             |
| mass           | affect_mass      | disabled      | When enabled, changes to the curves are applied to the mass of the particles.                                                                                                                                                                                                                                             |
| Conditions Tab |                  |               |                                                                                                                                                                                                                                                                                                                           |
| probability    | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                     |
| min age        | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                   |
| max age        | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                   |
| random seed    | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                     |
| channels       | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                        |
| Region Tab     |                  |               |                                                                                                                                                                                                                                                                                                                           |
| region         | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> </ul> |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <ul style="list-style-type: none"> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                  |
| transform order                                                                     | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| rotation order                                                                      | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| translate                                                                           | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| rotate         | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale          | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale  | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew           | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleDirectionalForce

Use ParticleDirectionalForce to apply a directional force, rather like gravity, to your particles.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply the force. |

| Control (UI)                 | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleDirectionalForce Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display                      | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable                   | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render                       | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | same settings.                                                                                                                                                                                                                                                                                                            |
| Strength xyz     | strength         | 0, 0, 0       | Sets the direction of force applied to the particles on the <b>x</b> , <b>y</b> , and <b>z</b> axes.                                                                                                                                                                                                                      |
| Uniform Strength | uniformStrength  | 1             | Sets the strength applied to the directional force specified in the <b>Strength</b> control.                                                                                                                                                                                                                              |
| Conditions Tab   |                  |               |                                                                                                                                                                                                                                                                                                                           |
| probability      | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                     |
| min age          | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                   |
| max age          | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                   |
| random seed      | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                     |
| channels         | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                        |
| Region Tab       |                  |               |                                                                                                                                                                                                                                                                                                                           |
| region           | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> </ul> |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | <ul style="list-style-type: none"> <li>• <b>sphere, box, half-space</b>, and <b>cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                  |
| transform order                                                                     | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| rotation order                                                                      | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| translate      | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate         | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. you can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale          | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale  | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew           | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleDrag

With ParticleDrag, you can apply drag on your particles to gradually alter their velocity over time. This means particles will start off fast and gradually slow down, unless you use negative values to apply the reverse effect.

The formula is: **particle velocity\*(1-drag)**. If the drag value is 0.01, the particles lose 1% of their velocity per frame.

## Inputs and Controls

| Connection Type | Connection Name | Function                                               |
|-----------------|-----------------|--------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply drag. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleDrag Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display          | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                         |
|-----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| selectable      | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                    |
| render          | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                    |
| drag            | drag             | 0             | <p>Sets the proportion of each particle's velocity that is lost per frame, where 0.01 = 1 percent and 1 = 100 percent.</p> <div>  <b>Note:</b> Negative drag values increase the particle velocity. </div>      |
| rotational drag | rotational_drag  | 0             | <p>Sets the proportion of each particle's rotation that is lost per frame, where 0.01 = 1 percent and 1 = 100 percent.</p> <div>  <b>Note:</b> Negative values increase the particle rotation velocity. </div> |
| Conditions Tab  |                  |               |                                                                                                                                                                                                                                                                                                  |
| probability     | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                            |
| min age         | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                          |
| max age         | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                          |
| random seed     | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                            |
| channels        | channels         | all           | Specifies which particle channels the effect of this node                                                                                                                                                                                                                                        |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|   | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                              |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. you can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticleEmitter

ParticleEmitter is the only required node for creating particles, but with no geometry input the normal along which particles travel is the y-axis. Once you've connected a Viewer and your geometry, click play on the timeline to see the default set of particles emitting from your geometry.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                    |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | particle        | The image or geometry to emit as particles - when you connect up this input, another particle input is created allowing you to mix particle types. You can also use a <a href="#">PositionToPoints</a> point cloud as the emitted particle. |
|                 | emit            | <p>The geometry from which the particles are emitted. You can also emit from PositionToPoints point clouds using any normals information present.</p> <p>See <a href="#">PositionToPoints</a> for more information.</p>                     |
|                 | merge           | Another particle system, including another ParticleEmitter.                                                                                                                                                                                 |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleEmitter Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display             | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable          | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render              | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| start at            | start_frame      | 0             | <p>Sets which frame the particles start emitting. Negative values cause the particles to start before frame 0, and positive values delay the particles.</p> <p>For example, you might want your particles to start before time zero, allowing them to spread out before rendering - the snow is already there, not just starting to fall.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| channels            | channels         | a             | The particles only exist in the selected channel(s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| emit from           | emit_from        | points        | <p>Sets where particles emit from:</p> <ul style="list-style-type: none"> <li>• <b>points</b> - emit from geometry points, including PositionToPoints point clouds.</li> <li>• <b>edges</b> - emit from geometry edges.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)  | Knob (Scripting) | Default Value       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |                     | <ul style="list-style-type: none"> <li>• <b>faces</b> - emit from geometry faces.</li> </ul> <div>  <b>Note:</b> Enabling <b>only emit from selected</b> allows you to emit from points selected in a preceding GeoSelect node. </div> <ul style="list-style-type: none"> <li>• <b>bbox</b> - emit from within the volume defined by the bbox of the geometry, which can reduce the need for pre-roll, start at, when creating volumetric particle simulations.</li> </ul>                                                                                                            |
|               | emit_order       | randomly            | Sets how particles are emitted: <ul style="list-style-type: none"> <li>• <b>randomly</b> - particles are emitted from a random point on each face, though the same seed is used each time once generated.</li> <li>• <b>uniformly</b> - particles are emitted from every vertex on every frame, ignoring the <b>emission rate</b> setting.</li> <li>• <b>in order</b> - particles are emitted from the vertices of the geometry input in ascending order.</li> </ul>                                                                                                                                                                                                   |
|               | randomize_type   | no_random_direction | Sets how the initial particle velocity directions are randomized: <ul style="list-style-type: none"> <li>• <b>no random direction</b> - directions are not randomized. The emit object's normals are used to determine direction.</li> <li>• <b>randomized direction</b> - the initial directions are completely randomized.</li> <li>• <b>randomized outwards</b> - a randomly selected direction, depending on <b>emit from</b>: <ul style="list-style-type: none"> <li><b>bbox</b> - particles move away from the center.</li> <li><b>points, edges, and faces</b> - particles move away at no more than 90 degrees from the nearest normal.</li> </ul> </li> </ul> |
| emission rate | rate             | 10                  | Sets the exact number of particles emitted per frame and is affected by the <b>rate channel</b> control. If your <b>rate</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)            | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                     |               | <b>channel</b> is less than 1 all the way through, the emission rate lessens.                                                                                                                                                                                                                                                                                                                                                                                                           |
| only emit from selected | selection_only      | disabled      | When enabled, only points selected in a preceding GeoSelect node are used as <b>emit from</b> sites. See <a href="#">GeoSelect</a> for more information.                                                                                                                                                                                                                                                                                                                                |
| threshold               | selection_threshold | 0.5           | When <b>only emit from selected</b> is enabled and <b>emit from</b> is set to something other than <b>points</b> , this control indicates the threshold used for selection testing. For example, if set to 0.5 then the boundary is exactly halfway between selected and unselected points.                                                                                                                                                                                             |
| vertex emission rate    | vertex_rate         | 1             | <p>When <b>emit_order</b> is set to <b>uniformly</b>, sets the number of particles emitted per vertex per frame. It is an exact number, not an average, and decreases if you change the probability.</p> <div>  <b>Note:</b> This control is affected by the setting of the rate channel. If your rate channel is not at a value of 1 all the way through, the emission rate is less.         </div> |
| rate variation          | rate_variation      | 0             | <p>Produces a random emission variation by adding a Gaussian-distributed random number to the <b>emission rate</b> value multiplied by the <b>rate variation</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>emission rate</b> and 1 is very random variation.</p>                                                                                                                                                                                                             |
| rate channel            | N/A                 | disabled      | Enables the associated rate channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                           |
|                         | rate_channel        | none          | Sets the channel of the input geometry texture which is used to modulate the <b>emission rate</b> . You can use this control to emit particles from certain areas of the input geometry.                                                                                                                                                                                                                                                                                                |

| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               | For example, if you are emitting from a Card which has a Ramp texture, more particles are emitted from the light part of the Ramp (values closer to 1) than from the dark parts (values closer to 0).                                                                                                                                                                                                 |
| max lifetime       | lifetime           | 10            | Sets the number of frames that each particle exists for.                                                                                                                                                                                                                                                                                                                                              |
| max lifetime range | lifetime_variation | 0             | <p>Produces a random lifetime variation by adding a Gaussian-distributed random number to the <b>max lifetime</b> value multiplied by the <b>max lifetime range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>max lifetime</b> and 1 is very random variation.</p>                                                                                                                         |
| lifetime channel   | N/A                | disabled      | Enables the associated lifetime channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                     |
|                    | lifetime_channel   | none          | <p>Sets the channel of the input geometry texture which is used to modulate the <b>max lifetime</b>.</p> <p>For example, if you are emitting from a Card which has a Ramp texture, particles emitted from the light parts of the ramp (values closer to 1) have a lifetime value closer to that set in the <b>max lifetime</b> than particles emitted from the dark parts (values closer to 0).</p>   |
| halflife           | halflife           | 0             | <p>Sets a <b>halflife</b> causing a fraction of the particles to die randomly each frame such that on average, half of the particles that existed at a given time will continue to exist after the <b>halflife</b> (in the same way as radioactive decay).</p> <p>For example, after twice the <b>halflife</b> value in frames, only a quarter of the original particles will be left, and so on.</p> |
| velocity           | velocity           | 1             | Sets the speed in units per frame of the particles as they leave the emitter.                                                                                                                                                                                                                                                                                                                         |
| velocity range     | velocity_          | 0             | Produces a random velocity variation by adding a                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)            | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|-----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | variation                   |               | <p>Gaussian-distributed random number to the <b>velocity</b> value multiplied by the <b>velocity range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>velocity</b> and 1 is very random variation.</p>                                                                                                                                                                                                                                                                                                                                                                                              |
| velocity channel        | N/A                         | disabled      | <p>Enables the associated velocity channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                         | velocity_channel            | none          | <p>Sets the channel of the input geometry texture which is used to modulate the <b>velocity</b>.</p> <p>For example, if you are emitting from a Card which has a Ramp texture, particles are emitted from the light parts of the ramp at a higher <b>velocity</b> (values closer to 1) than from the dark parts (values closer to 0).</p>                                                                                                                                                                                                                                                                     |
| rotation velocity       | rotation_velocity           | 0             | <p>Sets how quickly particles spin around their local y axis in 3D space.</p> <p>The y axis points in the direction the particles were initially emitted, but then stays unchanged. You can use the ParticleMotionAlign node to align particles along their direction of motion, or the ParticleLookAt node to cause all particles to align in a particular direction.</p> <div>  <b>Note:</b> Rotation velocity is only applicable to particles with geometry, sprite rotation is not currently supported.         </div> |
| rotation velocity range | rotation_velocity_variation | 0             | <p>Produces a random rotation velocity by adding a Gaussian-distributed random number to the <b>rotation velocity</b> value multiplied by the <b>rotation velocity range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>rotation velocity</b> and 1 is very random variation.</p>                                                                                                                                                                                                                                                                                                                   |



| Control (UI)              | Knob (Scripting)          | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|---------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rotation velocity channel | N/A                       | disabled      | Enables the associated rotation velocity channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                         |
|                           | rotation_velocity_channel | none          | <p>Sets the channel of the input geometry texture which is used to modulate the <b>rotation velocity</b>.</p> <p>For example, if you are emitting from a Card which has a Ramp texture, particles are emitted from the light parts of the ramp at a higher <b>rotation velocity</b> (values closer to 1) than from the dark parts (values closer to 0).</p>                        |
| size                      | size                      | 0.1           | Sets the size of each particle. If the <b>particle</b> input is geometry, the instance of that geometry at each particle is affected by this value.                                                                                                                                                                                                                                |
| size range                | size_variation            | 0             | <p>Produces a random variation in particle size by adding a Gaussian-distributed random number to the <b>size</b> value multiplied by the <b>size range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>size</b> and 1 is very random variation.</p>                                                                                                                      |
| size channel              | N/A                       | disabled      | Enables the associated size channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                      |
|                           | size_channel              | none          | <p>Sets the channel of the input geometry texture which is used to modulate the <b>size</b> of the particles.</p> <p>For example, if you are emitting from a Card which has a Ramp texture, the <b>size</b> of the particles emitted from the light part of the Ramp (values closer to 1) will be greater than that of those emitted from the dark parts (values closer to 0).</p> |
| mass                      | mass                      | 1             | Sets the mass of each particle when a force is applied, for example when using the ParticlePointForce node.                                                                                                                                                                                                                                                                        |
| mass range                | mass_variation            | 0             | Produces a random in particle mass by adding a Gaussian-distributed random number to the <b>mass</b> value multiplied                                                                                                                                                                                                                                                              |

| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               | <p>by the <b>mass range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>mass</b> and 1 is very random variation.</p>                                                                                                                                                                                                                                                                                                                                                                |
| mass channel       | N/A                | disabled      | <p>Enables the associated mass channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b>.</p>                                                                                                                                                                                                                                                                                                                                                          |
|                    | mass_channel       | none          | <p>Sets the channel of the input geometry texture which is used to modulate the <b>mass</b> of the particles. You can use this control to emit particles with different mass from different areas.</p> <p>For example, if you are emitting from a Card which has a Ramp texture, the particles from the light part of the Ramp (values closer to 1) will have a higher <b>mass</b> value (based on a percentage of the <b>mass</b> value) than from the dark parts (values closer to 0).</p> |
| transfer velocity  | transfer_velocity  | 0             | <p>Sets the transfer strength of any velocity that the initial emitter had to the particles.</p> <p>Setting this to 0 transfers no velocity to the spawned particles. At value 1, full velocity is transferred from the originating particle.</p>                                                                                                                                                                                                                                            |
| transfer window    | transfer_window    | 1             | <p>Sets the time, in frames, to look forward and backward to determine the <b>transfer velocity</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                     |
| spread             | spread             | 0             | <p>Applies a spread to the particles - by default, a cone shape around the direction of emission.</p>                                                                                                                                                                                                                                                                                                                                                                                        |
| color              | color              | 1             | <p>Sets the initial color of particles when the <b>particle</b> input is not connected.</p>                                                                                                                                                                                                                                                                                                                                                                                                  |
| color from texture | color_from_texture | disabled      | <p>When enabled, the particles take their initial color from the color of the emitter geometry texture at the point of emission. The color modulates as the texture changes.</p>                                                                                                                                                                                                                                                                                                             |
| input order        | input_order        | randomly      | <p>Sets the order of <b>particle</b> inputs used for the</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)    | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                       |               | representation: <ul style="list-style-type: none"> <li>• <b>randomly</b> - a random input is picked for each particle emitted.</li> <li>• <b>in order</b> - the inputs are cycled through for each particle emitted.</li> </ul>                                                                                                                                                                                                                                |
| start at        | start_frame_animation | first         | Determines which frame a newly emitted particle's representation starts from: <ul style="list-style-type: none"> <li>• <b>first</b> - uses the first frame from the input for each new particle.</li> <li>• <b>in order</b> - uses successive frames for each new particle.</li> <li>• <b>current</b> - uses the frame from which the particle was emitted.</li> <li>• <b>random</b> - uses a random frame within the representation's frame range.</li> </ul> |
| limit to range  | start_wrap            | disabled      | When enabled, particle start frames are forced to be within the range of the representation input. This causes the <b>start at &gt; in order</b> and <b>current</b> options to wrap round back to the start of the frame range once it has been exceeded, in a continuous loop.                                                                                                                                                                                |
| advance         | frame_advance         | in steps      | Determines whether particle representations animate after emission: <ul style="list-style-type: none"> <li>• <b>constant</b> - particles do not animate, and keep the same representation for their entire lifetime.</li> <li>• <b>in steps</b> - the particle's representation advances frame by frame.</li> <li>• <b>randomly</b> - a different random frame is picked each time.</li> </ul>                                                                 |
| max clip length | max_clip_length       | 100           | Sets the number of frames used in animation from the representation input.                                                                                                                                                                                                                                                                                                                                                                                     |
| random seed     | seed                  | 0             | Sets a random seed to create more varied results, for example in conjunction with the range controls in the emitter such as <b>velocity range</b> . You can achieve slightly                                                                                                                                                                                                                                                                                   |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | different effects by changing the seed number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation,</li> </ul>                                                                                                                                                                                             |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | and size depending on the points selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticleExpression

With ParticleExpression, you can adjust your particles by setting expressions on their attributes. Using expressions gives you a vast variety of ways of adjusting the way your particles behave. You can use a similar expression syntax as you would elsewhere in Nuke, with the exception that some functions which work in normal Nuke expressions aren't available in particle expressions and vice versa. The main difference between Nuke's Expression node and ParticleExpression is that particle expressions can return a 3D vector instead of just a single floating point number. If a particle expression returns a single number N in a field that expects a vector (such as velocity or acceleration) it will be converted into a vector with N for each of its components. For more information about functions you can use with ParticleExpression, see Nuke's [online help](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                      |
|-----------------|-----------------|---------------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply expressions. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                      |
|------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleExpression Tab |                  |               |                                                                                                                                                                                                                                                                                                                                               |
| [temp name field]      | temp_name0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the other particle controls.              |
| =                      | temp_expr0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the other particle controls. |
| per-particle           | temp_expr0_pp    | enabled       | When enabled, this temporary expression is evaluated per-particle.                                                                                                                                                                                                                                                                            |
| [temp name field]      | temp_name1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the other particle controls.              |
| =                      | temp_expr1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the other particle controls. |
| per-particle           | temp_expr1_pp    | enabled       | When enabled, this temporary expression is evaluated per-particle.                                                                                                                                                                                                                                                                            |
| [temp name field]      | temp_name2       | N/A           | If you need to use a long expression in several fields,                                                                                                                                                                                                                                                                                       |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                      |
|-------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| field]            |                  |               | you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the other particle controls.                                                                      |
| =                 | temp_expr2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the other particle controls. |
| per-particle      | temp_expr2_pp    | enabled       | When enabled, this temporary expression is evaluated per-particle.                                                                                                                                                                                                                                                                            |
| [temp name field] | temp_name3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the = fields next to the other particle controls.              |
| =                 | temp_expr3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the = fields next to the other particle controls. |
| per-particle      | temp_expr3_pp    | enabled       | When enabled, this temporary expression is evaluated per-particle.                                                                                                                                                                                                                                                                            |
| color             | colexpr          | N/A           | Sets expressions controlling particle color.                                                                                                                                                                                                                                                                                                  |
| only on new       | colexpr_onlynew  | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new                                                                                                                                                                                                                                            |



| Control (UI) | Knob (Scripting)    | Default Value | Function                                                                                                      |
|--------------|---------------------|---------------|---------------------------------------------------------------------------------------------------------------|
|              |                     |               | particles.                                                                                                    |
| opacity      | opacity_expr        | N/A           | Sets expressions controlling particle opacity.                                                                |
| only on new  | opacityexpr_onlynew | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| size         | sizeexpr            | N/A           | Sets expressions controlling particle size.                                                                   |
| only on new  | sizeexpr_onlynew    | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| mass         | massexpr            | N/A           | Sets expressions controlling particle mass.                                                                   |
| only on new  | massexpr_onlynew    | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| accel        | accelexpr           | N/A           | Sets expressions controlling particle acceleration.                                                           |
| only on new  | accelexpr_onlynew   | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| force        | forceexpr           | N/A           | Sets expressions controlling particle force.                                                                  |
| only on new  | forceexpr_onlynew   | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| pos          | posexpr             | N/A           | Sets expressions controlling particle position.                                                               |
| only on new  | _onlynewposexpr     | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |
| vel          | velexpr             | N/A           | Sets expressions controlling particle velocity.                                                               |
| only on new  | velexpr_onlynew     | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles. |

| Control (UI)   | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                               |
|----------------|----------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| frame          | frameexpr            | N/A           | Sets expressions controlling the frame used for particle geometry or texture.                                                                                                                                                                          |
| only on new    | frameexpr_onlynew    | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles.                                                                                                                                          |
| chans          | channelsexpr         | N/A           | Sets expressions controlling whether or not the channels specified in the <b>set to</b> control are applied to the particles.                                                                                                                          |
| only on new    | channelsexpr_onlynew | disabled      | When disabled, the expression affects all particles. When enabled, the expression only affects new particles.                                                                                                                                          |
| set to         | new_channels         | b             | Sets the new channels to assign to particles matching the <b>chans</b> expression.<br><br><div> <b>Note:</b> Particles are deleted if <b>none</b> is selected.</div> |
| Conditions Tab |                      |               |                                                                                                                                                                                                                                                        |
| probability    | probability          | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                  |
| min age        | min_age              | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                |
| max age        | max_age              | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                |
| random seed    | seed                 | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                  |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                         |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                                          |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <ul style="list-style-type: none"> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                                                                                                                                                                              |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                       |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticleGravity

With ParticleGravity, you can apply gravity to your particles. Unlike our familiar gravity, particle gravity works in any or all of the x, y and z directions, and you can also set negative values to them. When you connect the ParticleGravity node to your particle stream, an arrow appears in the Viewer, which you can then use to control the gravity. The bigger and longer the arrow, the stronger the gravity effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                  |
|-----------------|-----------------|-----------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply gravity. |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                   |
|---------------------|------------------|---------------|------------------------------------------------------------|
| ParticleGravity Tab |                  |               |                                                            |
| display             | display          | unchanged     | Adjust the display characteristics of the particles. These |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable     | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| render         | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| from xyz       | from             | N/A           | Sets the point of origin for the vector on the <b>x</b> , <b>y</b> , and <b>z</b> axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| to xyz         | to               | N/A           | <p>Sets the acceleration to be applied to all particles, depending on the direction and magnitude of the vector applied - the bigger and longer the arrow, the stronger the gravity effect.</p> <p>The position of the vector has no effect and Gravity affects all particles equally, irrespective of mass.</p>                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Conditions Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| probability    | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| min age        | min_age          | 0             | Limits the effect of this node to particles above this                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| max age                                                                             | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                             |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                                                                                                                               |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                  |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                           |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.                                                                                                                                                                                                                                                                                                                                                                                    |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleInfo

The ParticleInfo node displays particle data from any particle system attached to the node's input, which is useful for troubleshooting if your particles aren't behaving correctly. For example, if a particle's texture didn't display as expected, you could enable **orientation as axis** to overlay axes in the 3D Viewer to check the particle's orientation. Available data includes particle index, velocity, and position as well as the total number of particles in the system. The maximum number of particles within a system in Nuke is 1000000.

# Inputs and Controls

| Connection Type | Connection Name | Function                                                        |
|-----------------|-----------------|-----------------------------------------------------------------|
| Input           | particles       | The particle system from which to display particle information. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleInfo Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| display          | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particle's display mode. The Viewer can override this setting.</li> </ul> |
| selectable       | selectable       | on            | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                     |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| render       | render_mode      | unchanged     | Sets how the particles are rendered. This control is independent from the <b>display</b> selection, but has the same settings.                               |
| show count   | show_count       | on            | Displays the total particle count in the system attached to the node, up to a maximum of 1000000.                                                            |
| index        | showIndex        | off           | Displays the index of each particle in the system starting from 0 for the first particle.                                                                    |
| ID           | showId           | off           | Displays the unique identifier assigned to each particle in the system after it is emitted.                                                                  |
| frame        | showFrame        | off           | Displays the current frame for each particle's texture.                                                                                                      |
| first frame  | showFirstFrame   | off           | Displays the first frame for each particle's texture.                                                                                                        |
| last frame   | showLastFrame    | off           | Displays the last frame for each particle's texture.                                                                                                         |
| time         | showTime         | off           | Displays the age of each particle since it was emitted, in frames.                                                                                           |
| life         | showLife         | off           | Displays the maximum lifetime of each particle as set in the ParticleEmitter <b>max lifetime</b> control and within the <b>max lifetime range</b> specified. |
| age          | showAge          | off           | Displays each particles age, which is calculated as <b>time/life</b> and shown as a value between 0 and 1.                                                   |
| velocity as  | showVelocity     | off           | Displays the velocity of each                                                                                                                                |

| Control (UI)              | Knob (Scripting)         | Default Value | Function                                                                                                                                                                                                     |
|---------------------------|--------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| text                      |                          |               | particle at the current frame as an XYZ coordinate direction.                                                                                                                                                |
| velocity as vector        | showVelocityAsVector     | off           | Displays the velocity of each particle at the current frame as an arrow indicating direction. The length of the arrow also indicates the particle's position in the next frame.                              |
| orientation as text       | showOrientation          | off           | Displays the orientation of each particle at the current frame as a quaternion, the quotient of two vectors.                                                                                                 |
| orientation as axis       | showOrientationAsAxis    | off           | Displays the orientation of each particle at the current frame as XYZ axes.                                                                                                                                  |
| rotation axis as text     | showRotationAxis         | off           | Displays the rotation axis as text. The rotation axis is the axis around which particles rotate if <b>rotation_velocity</b> in the ParticleEmitter is set to anything other than 0.                          |
| rotation axis as vector   | showRotationAxisAsVector | off           | Displays the rotation axis as an arrow indicating direction. The rotation axis is the axis around which particles rotate if <b>rotation_velocity</b> in the ParticleEmitter is set to anything other than 0. |
| sprite rotation (degrees) | showRotationAngle        | off           | When emitting sprites, displays the rotation of each sprite at the current frame in degrees.                                                                                                                 |
| position                  | showPosition             | off           | Displays the position of each particle at the current frame in relation to the emitter origin as an                                                                                                          |

| Control (UI)          | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                    |
|-----------------------|-----------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                             |               | XYZ coordinate.                                                                                                                                                                                             |
| last pos as text      | showLastPosition            | off           | Displays the position of each particle in the previous frame in relation to the emitter origin as an XYZ coordinate.                                                                                        |
| last pos as vector    | showLastPositionAsVector    | off           | Displays the position of each particle in the previous frame as an arrow indicating direction to the current frame.                                                                                         |
| initial pos as text   | showInitialPosition         | off           | Displays the initial position of each particle as an XYZ coordinate.                                                                                                                                        |
| initial pos as vector | showInitialPositionAsVector | off           | Displays the initial position of each particle as an arrow indicating direction to the current frame.                                                                                                       |
| color                 | showColor                   | off           | Displays the RGBA values of each particle at the current frame .                                                                                                                                            |
| size                  | showSize                    | off           | Displays the size of each particle as set in the ParticleEmitter <b>size</b> control and within the <b>size range</b> specified.                                                                            |
| mass                  | showMass                    | off           | Displays the mass of each particle as set in the ParticleEmitter <b>mass</b> control and within the <b>mass range</b> specified. A particle's mass is only useful when a force is applied to the particles. |
| channels              | showChannels                | off           | Particles are emitted with channels <b>a</b> by default. You can change the channels with a ParticleExpression or                                                                                           |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                               |
|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | ParticleBounce node so that downstream nodes only act on particles in certain channels. For example, you could emit particles you don't want gravity to affect in channel <b>b</b> and set your ParticleGravity node to only affect channel <b>a</b> . |
| axis scale     | axisScale        | 1             | When controls like <b>velocity as vector</b> and <b>orientation as axis</b> are enabled, controls the size of the axis or axes displayed in the Viewer for each particle.                                                                              |
| first particle | firstParticle    | 0             | Controls the range of particles for which information is displayed, starting from the index of the <b>first particle</b> specified.                                                                                                                    |
| max particles  | maxParticles     | 1000          | You can use the <b>max particles</b> control to limit the amount of information on screen in large particle systems.                                                                                                                                   |

# ParticleLookAt

With ParticleLookAt, you can determine a 3D point at which all the particles within a certain region are looking toward.

# Inputs and Controls

| Connection Type | Connection Name | Function                                                      |
|-----------------|-----------------|---------------------------------------------------------------|
| Input           | particles       | The particle system you intend to align with a certain point. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleLookAt Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display            | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable         | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render             | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| position xyz       | position         | 0, 0, 0       | Sets the xyz coordinates that all particles look toward.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| strength           | strength         | 1             | Sets the speed at which particles turn to look at the specified <b>position</b> . A <b>strength</b> of 0 has no effect on the particles and a <b>strength</b> of 1 forces them to look at the <b>position</b> instantly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conditions Tab                                                                      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| probability                                                                         | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                     |
| min age                                                                             | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| max age                                                                             | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                     |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                        |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul> |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                      |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data</li> </ul>                                                                                                                                                                                                |



| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                           |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                             |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew           | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleMerge

If you have more than one set of particle nodes, and you want to combine them into one stream, ParticleMerge is your node. Attach your particle streams to ParticleMerge's numbered inputs and you're all set.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                               |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------|
| Input           | numbered inputs | The first particle system you intend to merge. Adding a particle system spawns another numbered input. |

# ParticleMotionAlign

You can add ParticleMotionAlign in your particle stream to realign all the particles along their direction of motion.

## Inputs and Controls

| Connection Type | Connection Name | Function                                 |
|-----------------|-----------------|------------------------------------------|
| Input           | particles       | The particle system you intend to align. |

| Control (UI)            | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleMotionAlign Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| display                 | display          | unchanged     | Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                            |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | <p>with the particles outlines.</p> <ul style="list-style-type: none"> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable     | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                       |
| render         | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                       |
| Conditions Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                     |
| probability    | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                               |
| min age        | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                             |
| max age        | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                             |
| random seed    | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                               |
| channels       | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to                                                                                                       |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation,</li> </ul>                                                                                                                                                                                             |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | and size depending on the points selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticlePointForce

With ParticlePointForce, you can attract or repel particles to or from a certain point in the 3D space. You can use an animated or still axis expression-linked to the position value, or a value you have chosen to enter manually.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply forces. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                               |
|------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticlePointForce Tab |                  |               |                                                                                                                                                                        |
| display                | display          | unchanged     | Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. |



| Control (UI)   | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |                | <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable     | selectable       | enabled        | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| render         | render_mode      | unchanged      | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| strength       | strength         | 0              | Sets the strength of the attraction, measured in inverse square. A negative value is an attraction and a positive value is a repulsion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| falloff        | falloff          | inverse square | <p>How quickly the strength of the attraction falls off with respect to distance:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - attraction or repulsion is constant, regardless of the distance from the <b>position</b> values.</li> <li>• <b>inverse</b> and <b>inverse square</b> - falloff is calculated with respect to the selected law.</li> </ul>                                                                                                                                                                                                                                             |
| radius         | radius           | 0              | The radius of influence. Particles outside the radius are ignored, particles inside will be attracted to or repelled from the chosen point position.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| position xyz   | position         | 0, 0, 0        | Sets the position of the point which attracts or repels the particles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Conditions Tab |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| probability                                                                         | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                     |
| min age                                                                             | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| max age                                                                             | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                     |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                        |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul> |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                      |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of</li> </ul>                                                                                                                                            |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | <p>Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</p> <ul style="list-style-type: none"> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul>                                                                               |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| skew           | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleSettings

Use the **steps per frame** control in the ParticleSettings control panel to adjust how many steps of particle simulation take place per animation frame.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                  |
|-----------------|-----------------|-----------------------------------------------------------|
| Input           | particles       | The particle system for which you intend modify settings. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleSettings Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                 |
| steps per frame      | steps_per_frame  | 1             | <p>Sets how many steps of particle simulation take place per animation frame.</p> <p>Sometimes simulations cannot generate enough accuracy by calculating once per frame and the resulting particle movement can appear jagged. Increasing <b>steps per frame</b> causes the simulation to asses the movement of the particles multiple times per frame to smooth movement.</p> |

# ParticleSpawn

If you're looking to have your existing particles emit even more particles, you should turn to ParticleSpawn. This node emits particles from existing particles.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                         |
|-----------------|-----------------|------------------------------------------------------------------|
| Input           | particle        | The image or geometry to emit as particles - when you connect up |

| Connection Type | Connection Name | Function                                                                                            |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------|
|                 |                 | this input, another particle input is created allowing you to mix particle types.                   |
|                 | merge           | Another particle system, including another ParticleEmitter, on which to base the spawned particles. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleSpawn Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| display           | display          | unchanged     | <p>Adjust the display characteristics of the spawned particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable        | selectable       | enabled       | When enabled, you can select the spawned particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render            | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| channels          | channels         | b             | The spawned particles only exist in the selected channel (s).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| emission rate     | rate             | 10            | Sets the exact number of particles spawned per frame and is affected by the <b>rate channel</b> control of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)   | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|--------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                    |               | ParticleEmitter. If your <b>rate channel</b> is less than 1 all the way through, the spawn rate lessens.                                                                                                                                                                                                                                                                                                              |
| rate variation | rate_variation     | 0             | <p>Produces a random emission variation by adding a Gaussian-distributed random number to the <b>emission rate</b> value multiplied by the <b>rate variation</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>emission rate</b> and 1 is very random variation.</p>                                                                                                                                           |
| lifetime       | lifetime           | 10            | Sets the number of frames that each spawned particle exists for.                                                                                                                                                                                                                                                                                                                                                      |
| lifetime range | lifetime_variation | 0             | <p>Produces a random lifetime variation by adding a Gaussian-distributed random number to the <b>lifetime</b> value multiplied by the <b>lifetime range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>lifetime</b> and 1 is very random variation.</p>                                                                                                                                                     |
| halflife       | halflife           | 0             | <p>Sets a <b>halflife</b> causing a fraction of the spawned particles to die randomly each frame such that on average, half of the particles that existed at a given time will continue to exist after the <b>halflife</b> (in the same way as radioactive decay).</p> <p>For example, after twice the <b>halflife</b> value in frames, only a quarter of the original spawned particles will be left, and so on.</p> |
| velocity       | velocity           | 1             | Sets the speed in units per frame of the particles as they spawn.                                                                                                                                                                                                                                                                                                                                                     |
| velocity range | velocity_variation | 0             | <p>Produces a random velocity variation by adding a Gaussian-distributed random number to the <b>velocity</b> value multiplied by the <b>velocity range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>velocity</b> and 1 is very random variation.</p>                                                                                                                                                     |
| rotation       | rotation_          | 0             | Sets how quickly spawned particles spin around their                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)            | Knob (Scripting)            | Default Value | Function                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|-----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| velocity                | velocity                    |               | <p>local y axis in 3D space.</p> <p>The y axis points in the direction the particles were initially spawned, but then stays unchanged. You can use the <a href="#">ParticleMotionAlign</a> node to align particles along their direction of motion, or the <a href="#">ParticleLookAt</a> node to cause all particles to align in a particular direction.</p> |
| rotation velocity range | rotation_velocity_variation | 0             | <p>Produces a random rotation velocity by adding a Gaussian-distributed random number to the <b>rotation velocity</b> value multiplied by the <b>rotationvelocity range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>rotationvelocity</b> and 1 is very random variation.</p>                                                                     |
| size                    | size                        | 0.1           | <p>Sets the size of each spawned particle. If the <b>particle</b> input is geometry, the instance of that geometry at each particle is affected by this value.</p>                                                                                                                                                                                            |
| size range              | size_variation              | 0             | <p>Produces a random variation in particle size by adding a Gaussian-distributed random number to the <b>size</b> value multiplied by the <b>size range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>size</b> and 1 is very random variation.</p>                                                                                                 |
| mass                    | mass                        | 0.1           | <p>Sets the mass of each spawned particle when a force is applied, for example when using the <a href="#">ParticlePointForce</a> node.</p>                                                                                                                                                                                                                    |
| mass range              | mass_variation              | 0             | <p>Produces a random in particle mass by adding a Gaussian-distributed random number to the <b>mass</b> value multiplied by the <b>mass range</b> value.</p> <p>Roughly speaking, 0 is equal to the <b>mass</b> and 1 is very random variation.</p>                                                                                                           |
| transfer velocity       | transfer_velocity           | 1             | <p>Transfers velocity from the initial emitter to the spawned particles on a sliding scale - all inherited velocity at 1, and</p>                                                                                                                                                                                                                             |

| Control (UI)                          | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                     |
|---------------------------------------|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       |                    |               | zero inherited velocity at 0.                                                                                                                                                                                                                                                                |
| spread                                | spread             | 0             | Applies a spread to the particles - by default, a cone shape around the direction of emission.                                                                                                                                                                                               |
| conservation of mass                  | conserve_mass      | enabled       | When enabled, the mass of any spawned particle is subtracted from the originating particle. If the mass of the originating particle is zero at the end of a frame, it is deleted.                                                                                                            |
| conservation of momentum              | conserve_momentum  | enabled       | When enabled, the momentum of any spawned particle is subtracted from the momentum of the originating particle, in correspondence with Newton's third law of motion.                                                                                                                         |
| align velocity to direction of motion | velocity_direction | enabled       | <p>When enabled, spawned particles inherit the velocity from the parent particle, but the direction of motion is dictated by the ParticleSpawn controls.</p> <p>When disabled, spawned particles inherit the direction of motion from the parent particle, but with increased velocity.</p>  |
| color                                 | color              | 1             | Sets the initial color of spawned particles when the <b>particle</b> input is not connected.                                                                                                                                                                                                 |
| inherit color                         | inherit_color      | disabled      | When enabled, the spawned particle's color is taken from the originating particle. When disabled, spawned particles derive their color from the <b>particle</b> input, if connected, or the <b>color</b> control.                                                                            |
| input order                           | input_order        | randomly      | <p>Sets the order of <b>particle</b> inputs used for the representation:</p> <ul style="list-style-type: none"> <li>• <b>randomly</b> - a random input is picked for each particle emitted.</li> <li>• <b>in order</b> - the inputs are cycled through for each particle emitted.</li> </ul> |
| start at                              | start_frame_       | first         | Determines which frame a newly emitted particle's                                                                                                                                                                                                                                            |



| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | animation        |               | <p>representation starts from:</p> <ul style="list-style-type: none"> <li>• <b>first</b> - uses the first frame from the input for each new particle.</li> <li>• <b>in order</b> - uses successive frames for each new particle.</li> <li>• <b>current</b> - uses the frame from which the particle was emitted.</li> <li>• <b>random</b> - uses a random frame within the representation's frame range.</li> </ul> |
| limit to range  | start_wrap       | disabled      | <p>When enabled, particle start frames are forced to be within the range of the representation input. This causes the <b>start at</b> &gt; <b>in order</b> and <b>current</b> options to wrap round back to the start of the frame range once it has been exceeded, in a continuous loop.</p>                                                                                                                       |
| advance         | frame_advance    | in steps      | <p>Determines whether particle representations animate after emission:</p> <ul style="list-style-type: none"> <li>• <b>constant</b> - particles do not animate, and keep the same representation for their entire lifetime.</li> <li>• <b>in steps</b> - the particle's representation advances frame by frame.</li> <li>• <b>randomly</b> - a different random frame is picked each time.</li> </ul>               |
| max clip length | max_clip_length  | 100           | <p>Sets the number of frames used in animation from the representation input.</p>                                                                                                                                                                                                                                                                                                                                   |
| Conditions Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| probability     | probability      | 1             | <p>Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.</p>                                                                                                                                                                                                                        |
| min age         | min_age          | 0             | <p>Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.</p>                                                                                                                                                                                                                                                                      |
| max age         | max_age          | 1             | <p>Limits the effect of this node to particles below this</p>                                                                                                                                                                                                                                                                                                                                                       |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                         |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| pivot                                                                             | pivot            | 0, 0, 0       | When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.                                                                                                                                                                               |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                       |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |

# ParticleSpeedLimit

ParticleSpeedLimit restricts particles to a specified minimum and maximum speed.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                       |
|-----------------|-----------------|----------------------------------------------------------------|
| Input           | particles       | The particle system in which you intend limit particle speeds. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleSpeedLimit Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display                | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable             | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render                 | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| minimum                | minimum          | 0             | Sets the minimum speed at which a particle can travel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| maximum                | maximum          | 100           | Sets the maximum speed at which a particle can travel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| strength               | strength         | 1             | Sets how quickly the particles change speed toward the <b>minimum</b> and <b>maximum</b> values. A <b>strength</b> of 0 has no effect on the particles and a <b>strength</b> of 1 forces them to change speed instantly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Conditions Tab         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| probability            | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| min age                | min_age          | 0             | Limits the effect of this node to particles above this                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| max age                                                                             | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                             |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                                                                                                                               |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                  |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                           |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.                                                                                                                                                                                                                                                                                                                                                                                    |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleToGeo

With ParticleToGeo, you can control particles in a simulation by channel, giving you the ability to isolate certain particles at any point in the Node Graph. For example, you might want to freeze certain particles within a simulation while allowing others to emit as normal or apply a particle effect to the particles in a single channel.



## Inputs and Controls

| Connection Type | Connection Name | Function                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------|
| Input           | particles       | The particle system for which you intend to create particle geometry. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleToGeo Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display           | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable        | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render            | render_mode      | unchanged     | Sets how the particles render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| channels          | channels         | all           | Sets which particles are affected, by channel. For example, setting <b>channels</b> to <b>a</b> only affects particles emitted into the <b>a</b> channel in the ParticleEmitter node's <b>Properties</b> panel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| align mode        | align            | none          | <p>Sets the way sprite particles are aligned:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - sprite particles are not aligned.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                  |               | <ul style="list-style-type: none"> <li>• <b>spin</b> - sprite particles are aligned according to their rotation.</li> <li>• <b>velocity</b> - sprite particles are aligned according to their velocity.</li> </ul> <div>  <b>Note:</b> This control has no effect on particles generated from geometry. </div> |
| frame         | frame            | 50            | <p>When <b>specify frame</b> is enabled, the <b>frame</b> control freezes the particles in the selected <b>channels</b> at the specified frame in the simulation.</p> <p>For example, you could freeze particles in a channel called <b>fog</b> at frame 50 while allowing particles in the other channels to simulate as normal.</p>                                                           |
| specify frame | use_frame        | disabled      | <p>When enabled, the <b>frame</b> control can be used to freeze particles at a certain frame in the simulation.</p>                                                                                                                                                                                                                                                                             |

# ParticleTurbulence

ParticleTurbulence applies noise to the particle movement, dispersing the particles in the x, y and/or z directions.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                     |
|-----------------|-----------------|--------------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply turbulence. |

| Control (UI)           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleTurbulence Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display                | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable             | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render                 | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| strength xyz           | strength         | 0, 0, 0       | Sets the strength of the turbulence force, which can be different along each axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| scale xyz              | scale            | 1, 1, 1       | Sets the scale of the noise lattice, which can be different along each axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| offset xyz             | offset           | 0, 0, 0       | Sets the offset applied to the noise lattice, which can be different along each axis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Conditions Tab         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| probability            | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| min age                | min_age          | 0             | Limits the effect of this node to particles above this                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| max age                                                                             | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                                                                                                                             |
| random seed                                                                         | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                                                                                                                               |
| channels                                                                            | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                  |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                           |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters</li> </ul> |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                  |               | that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.                                                                                                                                                                                                                                                                                                                                                                                    |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul> |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                          |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                        |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                 |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                |
| scale                                                                             | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| uniform scale                                                                     | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| skew                                                                              | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleVortex

ParticleVortex applies a circular force to the particles and attracts them to an imaginary line, thus creating a whirlpool of particles. When you connect the ParticleVortex node to your particle stream, an arrow appears in the 3D Viewer, which you can then use to determine direction and velocity of the vortex effect. The bigger and longer the arrow, the stronger the effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                     |
|-----------------|-----------------|--------------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply the vortex. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleVortex Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display            | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable         | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render             | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| parallel           | parallel         | 0             | Applies a force to particles in a direction parallel to the vector line. Negative values flow with the vector line and positive values against it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| parallel falloff   | parallel_falloff | none          | Sets which falloff law to use when calculating the effect of the force on each particle:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)       | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                  |
|--------------------|--------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                    |               | <ul style="list-style-type: none"> <li>• <b>none</b> - no falloff occurs, regardless of distance from the origin.</li> <li>• <b>inverse</b> and <b>inverse square</b> - falloff is calculated with respect to the selected law.</li> </ul>                                                                                                |
| tangential         | tangential         | 0             | Applies a force to particles in a direction tangential to the vector line. Negative values produce clockwise movement around the vector line and positive values counter-clockwise.                                                                                                                                                       |
| tangential falloff | tangential_falloff | inverse       | <p>Sets which falloff law to use when calculating the effect of the force on each particle:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no falloff occurs regardless of distance from the origin.</li> <li>• <b>inverse</b> and <b>inverse square</b> - falloff is calculated with respect to the selected law.</li> </ul> |
| radial             | radial             | 0             | Applies a force which attracts particles to (positive values), or repels them from (negative values) the vector line.                                                                                                                                                                                                                     |
| radial falloff     | radial_falloff     | inverse       | <p>Sets which falloff law to use when calculating the effect of the force on each particle:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - no falloff occurs regardless of distance from the origin.</li> <li>• <b>inverse</b> and <b>inverse square</b> - falloff is calculated with respect to the selected law.</li> </ul> |
| from xyz           | from               | 0, 0, 0       | <p>Sets the point of origin for the arrow on the <b>x</b>, <b>y</b>, and <b>z</b> axes.</p> <p>The arrow determines the direction and velocity of the vortex effect. The bigger and longer the arrow, the stronger the effect.</p>                                                                                                        |
| to xyz             | to                 | 0, 1, 0       | <p>Sets the point of destination for the arrow on the <b>x</b>, <b>y</b>, and <b>z</b> axes.</p> <p>The arrow determines the direction and velocity of the</p>                                                                                                                                                                            |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | vortex effect. The bigger and longer the arrow, the stronger the effect.                                                                                                                                                                                                                                                                                                                                                  |
| Conditions Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| probability    | probability      | 1             | Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.                                                                                                                                                                                                                                     |
| min age        | min_age          | 0             | Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| max age        | max_age          | 1             | Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.                                                                                                                                                                                                                                                                                   |
| random seed    | seed             | 0             | Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.                                                                                                                                                                                                                                                                     |
| channels       | channels         | all           | Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                        |
| Region Tab     |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| region         | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul> |
| invert region  | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)                                                                      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation, and size depending on the points selected.</li> </ul>                                                                                                                                                  |
| transform order                                                                   | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| rotation order                                                                    | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| translate                                                                         | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| rotate                                                                            | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| scale          | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale  | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew           | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot          | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                                                                                                                                                                                                                                                                   |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p>                                                                                                                                                                                                                                         |

# ParticleWind

With ParticleWind, you can simulate a wind blowing on the particles. When you connect the ParticleWind node to your particle stream, an arrow appears in the Viewer, which you can then use to determine direction and velocity of the wind. The bigger and longer the arrow, the stronger the wind effect.

## Inputs and Controls

| Connection Type | Connection Name | Function                                               |
|-----------------|-----------------|--------------------------------------------------------|
| Input           | particles       | The particle system to which you intend to apply wind. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ParticleWind Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| display          | display          | unchanged     | <p>Adjust the display characteristics of the particles. These settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer.</p> <ul style="list-style-type: none"> <li>• <b>off</b> - hides the particles.</li> <li>• <b>wireframe</b> - displays only the outlines of the particle.</li> <li>• <b>solid</b> - displays all particles with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the particles as solid color with the particles outlines.</li> <li>• <b>textured</b> - displays only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> <li>• <b>unchanged</b> - doesn't change the particles display mode. The Viewer can override this setting.</li> </ul> |
| selectable       | selectable       | enabled       | When enabled, you can select the particles in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| render           | render_mode      | unchanged     | Sets how the particles will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| from xyz         | from             | 0, 0, 0       | <p>Sets the point of origin for the arrow on the <b>x</b>, <b>y</b>, and <b>z</b> axes.</p> <p>The arrow determines the direction and velocity of the wind effect. The bigger and longer the arrow, the stronger the effect.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| to xyz         | to               | 0, 1, 0       | <p>Sets the point of destination for the arrow on the <b>x</b>, <b>y</b>, and <b>z</b> axes.</p> <p>The arrow determines the direction and velocity of the wind effect. The bigger and longer the arrow, the stronger the effect.</p> <div>  <b>Note:</b> Particles are gradually accelerated, they aren't emitted at full speed. </div> |
| drag           | drag             | 0.2           | <p>Sets the amount of simulated drag applied to particles. Higher values drag the particles further from their origin, and vice versa.</p>                                                                                                                                                                                                                                                                                |
| air resistance | air_resistance   | disabled      | <p>When enabled, simulated resistance is added to the drag control progressively slowing particles down over time in a similar way to ParticleDrag.</p>                                                                                                                                                                                                                                                                   |
| Conditions Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                           |
| probability    | probability      | 1             | <p>Sets the probability that this node affects your particles. If you set this to zero, the node won't affect any particles, and if the value is 1, the node will affect every particle.</p>                                                                                                                                                                                                                              |
| min age        | min_age          | 0             | <p>Limits the effect of this node to particles above this minimum age. The age of the particle is its lifetime normalized between 0 and 1.</p>                                                                                                                                                                                                                                                                            |
| max age        | max_age          | 1             | <p>Limits the effect of this node to particles below this maximum age. The age of the particle is its lifetime normalized between 0 and 1.</p>                                                                                                                                                                                                                                                                            |
| random seed    | seed             | 0             | <p>Sets the integer to change the results of generated randomness in your particles. You can achieve slightly different effects by changing this number.</p>                                                                                                                                                                                                                                                              |
| channels       | channels         | all           | <p>Specifies which particle channels the effect of this node should be applied to. Channels <b>a</b> and <b>b</b> are arbitrary names for channels which are useful if you want different</p>                                                                                                                                                                                                                             |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     |                  |               | ParticleEmitter nodes or other particle force nodes to have an effect on separate channels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Region Tab                                                                          |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| region                                                                              | region           | none          | <p>Sets the region which you want to use to confine the particle effect to. For example, if you choose a <b>sphere</b>, only particles inside that sphere shaped region will be affected by particle effects.</p> <ul style="list-style-type: none"> <li>• <b>none</b> - all particles are affected as normal.</li> <li>• <b>sphere, box, half-space, and cylinder</b> - controls the region's boundary shape.</li> </ul>                                                                                                                                                                                                                                  |
| invert region                                                                       | region_invert    | disabled      | When enabled, particles outside the region are affected rather than those inside it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|    | file_menu        | N/A           | <p>Select to import or export a channel file:</p> <ul style="list-style-type: none"> <li>• <b>Import chan file</b> - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of Cartesian coordinates for every frame of animation in a given shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou.</li> <li>• <b>Export chan file</b> - export the translation parameters that you've applied to the region marker as a channel file. This is a useful method of sharing setups between artists.</li> </ul> |
|  | snap_menu        | N/A           | <ul style="list-style-type: none"> <li>• <b>Match selection position</b> - the region marker is snapped to a new position depending on the points selected.</li> <li>• <b>Match selection position, orientation</b> - the region marker is snapped to a new position and orientation depending on the points selected.</li> <li>• <b>Match selection position, orientation, size</b> - the region marker is snapped to a new position, orientation,</li> </ul>                                                                                                                                                                                             |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | and size depending on the points selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| transform order | xform_order      | SRT           | Sets the operation order for scale (S), rotation (R), and translation (T). The possible operation combinations are SRT, STR, RST, RTS, TSR, TRS.                                                                                                                                                                                                                                                                                                                                                                              |
| rotation order  | rot_order        | ZXY           | Sets the order of rotation. The possible axial combinations are ZXY, XYZ, XZY, YXZ, YZX, ZXY, ZYX.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| translate       | translate        | 0, 0, 0       | Lets you translate the region marker along the x, y, and z axes. You can also adjust translate values by clicking and dragging the axis in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                     |
| rotate          | rotate           | 0, 0, 0       | Lets you rotate the region marker around the x, y, and z axes. You can adjust rotate values by holding down <b>Ctrl/Cmd</b> and dragging in the 3D Viewer.                                                                                                                                                                                                                                                                                                                                                                    |
| scale           | scaling          | 1, 1, 1       | Lets you scale the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| uniform scale   | uniform_scale    | 1             | Lets you scale the region marker simultaneously on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| skew            | skew             | 0, 0, 0       | Lets you skew the region marker on the x, y, and z axes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| pivot           | pivot            | 0, 0, 0       | <p>When you make changes to the region marker's position, scaling, skewing, and rotation, these occur from the location of the object's origin point or pivot. The pivot x, y, and z controls allow you to offset the pivot point and move it anywhere you like - you can even move it outside of the object. Subsequent transformations applied will then occur relative to the new pivot point location.</p> <p>You can also hold down <b>Ctrl/Cmd+Alt</b> and drag the pivot point to a new location in the 3D Viewer.</p> |
| Local Matrix    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                              |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| specify matrix | useMatrix        | N/A           | Enable this control to specify matrix values for the object you're transforming as an alternative to setting transform, scale, skew and pivot values above.                                                                                                                           |
| matrix         | matrix           | N/A           | <p>The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls.</p> <p>Check <b>specify matrix</b> and copy or drag-and-drop matrix values from another object to apply those values, for example, if you wanted to align objects in a scene.</p> |



# Deep Nodes

Deep nodes deal with Deep image compositing, where each pixel can have multiple values.

## DeepColorCorrect

This is a ColorCorrect node for deep compositing. It applies the color correction to all samples at each pixel. You can use DeepColorCorrect to create a matte by setting the **gain** value for your alpha channel to 0 and setting the **offset** value to 1 in the range you want the matte for.

There are control sets for adjusting **shadows**, **midtones** and **highlights**. You can use the lookup curves on the **Ranges** tab to control these.

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                          |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image sequence to receive the color correction. This can also be a DeepMerge node with merged deep data. |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                    |
|----------------------|------------------|---------------|---------------------------------------------|
| DeepColorCorrect Tab |                  |               |                                             |
| master               |                  |               |                                             |
| saturation           | saturation       | 1             | Adjusts the saturation in the entire image. |
| contrast             | contrast         | 1             | Adjusts the contrast in the entire image.   |
| gamma                | gamma            | 1             | Adjusts the gamma in the entire image.      |

| Control (UI) | Knob (Scripting)      | Default Value | Function                                                  |
|--------------|-----------------------|---------------|-----------------------------------------------------------|
| gain         | gain                  | 1             | Adjusts the gain in the entire image.                     |
| offset       | offset                | 0             | Adjusts the offset in the entire image.                   |
| shadows      |                       |               |                                                           |
| saturation   | shadows.saturation    | 1             | Adjusts the saturation in the darkest parts of the image. |
| contrast     | shadows.contrast      | 1             | Adjusts the contrast in the darkest parts of the image.   |
| gamma        | shadows.gamma         | 1             | Adjusts the gamma in the darkest parts of the image.      |
| gain         | shadows.gain          | 1             | Adjusts the gain in the darkest parts of the image.       |
| offset       | shadows.offset        | 0             | Adjusts the offset in the darkest parts of the image.     |
| midtone      |                       |               |                                                           |
| saturation   | midtone.saturation    | 1             | Adjusts the saturation in the middle range of the image.  |
| contrast     | midtone.contrast      | 1             | Adjusts the contrast in the middle range of the image.    |
| gamma        | midtone.gamma         | 1             | Adjusts the gamma in the middle range of the image.       |
| gain         | midtone.gain          | 1             | Adjusts the gain in the middle range of the image.        |
| offset       | midtone.offset        | 0             | Adjusts the offset in the middle range of the image.      |
| highlights   |                       |               |                                                           |
| saturation   | highlights.saturation | 1             | Adjusts the saturation in the highlights of the image.    |
| contrast     | highlights.contrast   | 1             | Adjusts the contrast in the highlights of the             |

| Control (UI)    | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                           |
|-----------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                   |               | image.                                                                                                                                                                                                                             |
| gamma           | highlights.gamma  | 1             | Adjusts the gamma in the highlights of the image.                                                                                                                                                                                  |
| gain            | highlights.gain   | 1             | Adjusts the gain in the highlights of the image.                                                                                                                                                                                   |
| offset          | highlights.offset | 0             | Adjusts the offset in the highlights of the image.                                                                                                                                                                                 |
| Masking Tab     |                   |               |                                                                                                                                                                                                                                    |
| mix             | mix               | 1             | Dissolves between the original image at 0 and the full color correction at 1.                                                                                                                                                      |
| zmap A, B, C, D | zmap              | 0, 1, 1, 1    | Sets how much of the color correction to use at various depths. The x axis represents the distance from the camera, and the y axis the fraction of the color correction to use (where 0 is none and 1 is the full effect).         |
| limit_z         | limit_z           | disabled      | When enabled, allows dissolving between the original image and the full color correction depending on the depth of the samples, using the <b>zmap</b> control.                                                                     |
| Ranges Tab      |                   |               |                                                                                                                                                                                                                                    |
| test            | test              | disabled      | Lets you overlay the output with black, gray, or white to show what is considered to be in the shadows, midtones, or highlights. Green and magenta indicate a mixture of ranges.                                                   |
| curve editor    | lookup            | N/A           | You can use the <b>shadow</b> and <b>highlight</b> lookup curves to edit the range of the image that is considered to be in the shadows or highlights. You can also look up color information for the current pixel in the Viewer. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                             |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               |  <b>Warning:</b> DO NOT adjust the <b>midtone</b> curve. Midtones are always equal to 1 minus the other two curves. |
| reset        | N/A              | N/A           | Return the selected curve(s) to the default values.                                                                                                                                                  |

# DeepCrop

You can use the DeepCrop node to:

- crop deep data in front of or behind certain planes in depth, or
- crop deep images inside or outside of the crop box in the Viewer (much like the regular [Crop](#) node).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                  |
|-----------------|-----------------|-------------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image sequence to crop. This can also be a DeepMerge node with merged deep data. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| DeepCrop Tab |                  |               |                                                                                                                                          |
| znear        | znear            | 1             | Sets the near depth value of the image. By default, any samples in front of this plane in depth (that is, below this value) are cropped. |
| use          | use_znear        | enabled       | Whether to crop samples below the <b>znear</b> value.                                                                                    |
| zfar         | zfar             | 2             | Sets the far depth value of the image. By default, any                                                                                   |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               | samples behind this plane in depth (that is, above this value) are cropped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| use                 | use_zfar         | enabled       | Whether to crop samples above the <b>zfar</b> value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| keep outside zrange | outside_zrange   | disabled      | <p>When enabled, samples between the <b>znear</b> and <b>zfar</b> values are cropped.</p> <p>When disabled, samples outside the <b>znear</b> to <b>zfar</b> range are cropped.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| bbox                | bbox             | N/A           | <p>Set the size of the crop box in the Viewer. By default, any areas outside this box are cropped.</p> <p>You can adjust the following:</p> <ul style="list-style-type: none"> <li>• <b>x</b> - the distance (in pixels) between the left edge of the image and the left side of the crop box.</li> <li>• <b>y</b> - the distance (in pixels) between the bottom edge of the image and the bottom edge of the crop box.</li> <li>• <b>r</b> - the distance (in pixels) between the left edge of the image and the right side of the crop box.</li> <li>• <b>t</b> - the distance (in pixels) between the bottom edge of the image and the top edge of the crop box.</li> <li>• <b>w</b> - the width of the crop box. This is only available if you click the <b>wh</b> button.</li> <li>• <b>h</b> - the height of the crop box. This is only available if you click the <b>wh</b> button.</li> </ul> <p>You can also adjust the crop box in the Viewer by dragging its edges.</p> |
| use                 | use_bbox         | enabled       | Set whether to use the crop box in the Viewer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| keep outside bbox   | outside_bbox     | disabled      | <p>When enabled, any samples inside the crop box are cropped.</p> <p>When disabled, any samples outside the crop box are cropped.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

# DeepExpression

The DeepExpression node allows you to apply complex mathematical formulae to deep data using expressions.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                    |
|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image sequence to which you want to apply expressions to. This can also be a DeepMerge node with merged deep data. |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|-----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepExpression Tab    |                  |               |                                                                                                                                                                                                                                                                                                                            |
| [variable name field] | temp_name0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the fields below the channels.              |
| =                     | temp_expr0       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the fields below the channels. |
| [variable name field] | temp_name1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the                                         |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                   |
|-----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | fields below the channels.                                                                                                                                                                                                                                                                                                 |
| =                     | temp_expr1       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the fields below the channels. |
| [variable name field] | temp_name2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the fields below the channels.              |
| =                     | temp_expr2       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the fields below the channels. |
| [variable name field] | temp_name3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name here, and the expression on the right of the = sign. You can then use the variable to represent the expression in the fields below the channels.              |
| -                     | temp_expr3       | N/A           | If you need to use a long expression in several fields, you can use this row for assigning the expression temporarily to a variable. Enter the variable name on the left side of the = sign, and the expression in this field. You can then use the variable to represent the expression in the fields below the channels. |

| Control (UI)        | Knob (Scripting) | Default Value           | Function                                                                                                                                |
|---------------------|------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| chans0              | chans0           | red, green, blue, alpha | The channel(s) to which you want to apply expressions to.<br><br>You can use the checkboxes on the right to select individual channels. |
| chans1              | chans1           | front, back             | The channel(s) to which you want to apply expressions to.<br><br>You can use the checkboxes on the right to select individual channels. |
| chans2              | chans2           | none                    | The channel(s) to which you want to apply expressions to.<br><br>You can use the checkboxes on the right to select individual channels. |
| chans3              | chans3           | none                    | The channel(s) to which you want to apply expressions to.<br><br>You can use the checkboxes on the right to select individual channels. |
| [expression fields] | N/A              | N/A                     | Expression fields for each channel selected above.                                                                                      |

# DeepFromFrames

The DeepFromFrames node copies multiple input frames from a regular 2D image to samples in a single deep frame.



## Inputs and Controls

| Connection Type | Connection Name | Function                                                        |
|-----------------|-----------------|-----------------------------------------------------------------|
| Input           | unnamed         | The image sequence from which you want to copy the frames from. |

| Control (UI)       | Knob (Scripting) | Default Value  | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepFromFrames Tab |                  |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| samples            | samples          | 5              | Sets the number of frames to sample the input at.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| frame range        | range_first      | 1              | Sets the start frame for sampling the input. For example, with the default <b>samples</b> value (5) and <b>frame range</b> value (1-9) DeepFromFrames samples at frames 1, 3, 5, 7 and 9.                                                                                                                                                                                                                                                                                                                                                  |
|                    | range_last       | 9              | Sets the end frame for sampling the input. For example, with the default <b>samples</b> value (5) and <b>frame range</b> value (1-9) DeepFromFrames samples at frames 1, 3, 5, 7 and 9.                                                                                                                                                                                                                                                                                                                                                    |
| premult            | premult          | enabled        | Set whether the input needs premultiplying.<br><br>When disabled, DeepFromFrames assumes that the input is already premultiplied.                                                                                                                                                                                                                                                                                                                                                                                                          |
| split alpha mode   | alpha_mode       | multiplicative | Set how the alpha channel is split: <ul style="list-style-type: none"> <li>• <b>additive</b> - performs a straight division by the number of samples. This does not result in the original alpha values if the deep samples are flattened later on.</li> <li>• <b>multiplicative</b> - the samples are split so that each is <math>1 - \text{pow}(1 - \alpha, 1 / \text{numSamples})</math>. If the deep samples are flattened later on (for example, using <a href="#">DeepToImage</a>), the alpha values match the originals.</li> </ul> |
| zmin               | zmin             | 1              | Sets the depth at which the first sampled frame is placed. This is the front-most sample in depth.                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                            |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------|
| zmax         | zmax             | 2             | Sets the depth at which the last sampled frame is placed. This is the furthestmost sample in depth. |

# DeepFromImage

Using DeepFromImage you can convert a standard 2D image to a deep image with a single sample for each pixel at the depth defined by the **depth.z** channel.

## Inputs and Controls

| Connection Type | Connection Name | Function                                          |
|-----------------|-----------------|---------------------------------------------------|
| Input           | 1               | The 2D image sequence to convert to a deep image. |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepFromImage Tab |                  |               |                                                                                                                                                                                                                                          |
| premult input     | premult          | disabled      | Set whether the input needs premultiplying.<br><br>When disabled, DeepFromImage assumes that the input is already premultiplied.                                                                                                         |
| specify z         | set_z            | disabled      | When enabled, you can use the <b>z</b> field below to manually specify the Z depth for the single sample at each pixel.<br><br>When disabled, the Z depth for the single sample at each pixel is defined by the input's depth.z channel. |
| z                 | z                | 0             | Set the Z depth value to use for the single sample at each pixel.                                                                                                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                 |
|--------------|------------------|---------------|--------------------------------------------------------------------------|
|              |                  |               | This control only has an effect when you have enabled <b>specify z</b> . |

# DeepMerge

DeepMerge merges samples from multiple deep images, so that each output pixel contains all of the samples from the same pixel in each input. You can also use it to **holdout** samples in the **B** input that are occluded by samples in the **A** input or **plus** overlapping samples from the **A** and **B** inputs.

## Inputs and Controls

| Connection Type | Connection Name | Function                                |
|-----------------|-----------------|-----------------------------------------|
| Input           | A, B            | The deep images that you want to merge. |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepMerge Tab       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| operation           | operation        | combine       | Sets how to merge the inputs: <ul style="list-style-type: none"> <li>• <b>combine</b> - combine the samples from the <b>A</b> and <b>B</b> inputs.</li> <li>• <b>holdout</b> - hold out samples from the <b>B</b> input by the samples in the <b>A</b> input. This removes or fades out samples in input <b>B</b> that are occluded by samples in input <b>A</b>.</li> <li>• <b>plus</b> - adds <b>A</b> and <b>B</b> overlapping samples, which can be useful when recombining data after a holdout.</li> </ul> |
| drop hidden samples | drop_hidden      | disabled      | When enabled, samples that are completely obscured by other samples are discarded (that is, samples behind other samples that have an alpha of 1).                                                                                                                                                                                                                                                                                                                                                               |

| Control (UI)        | Knob (Scripting)    | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |    |           |  |  |  |           |  |    |    |    |    |    |    |    |
|---------------------|---------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----|-----------|--|--|--|-----------|--|----|----|----|----|----|----|----|
|                     |                     |               | This control is only available when <b>operation</b> is set to <b>combine</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |    |           |  |  |  |           |  |    |    |    |    |    |    |    |
| drop zero threshold | drop_zero_threshold | 0.0000001     | <p>Any samples whose alpha value falls below this threshold are discarded from the holdout. This can help filter out samples with very low alpha values caused by floating point inaccuracy.</p> <p>This control is only available when <b>operation</b> is set to <b>holdout</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |    |           |  |  |  |           |  |    |    |    |    |    |    |    |
| metadata from       | metainput           | B             | <p>Sets which input's metadata is passed down the node tree.</p> <div> <b>Note:</b> When <b>metadata from</b> is set to <b>All</b> and there are keys with the same name in both inputs, keys in B override keys in A.</div>                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |    |           |  |  |  |           |  |    |    |    |    |    |    |    |
| volumetric holdout  | volumetric_holdout  | disabled      | <p>Enable <b>volumetric holdout</b> if you want Nuke to calculate occlusion using the values of the <b>holdout</b> samples in front of samples from <b>main</b>. This is a more accurate representation of occlusion at depth, but can take longer to process.</p> <p>For example:</p> <table><tr><td colspan="6">Depth 0</td><td colspan="2">Depth INF</td></tr><tr><td>M0</td><td>H0</td><td>H1</td><td>H2</td><td>M2</td><td>H3</td><td>M4</td></tr></table> <p>M = main sample</p> <p>H = holdout sample</p> <p><b>M0</b> remains unchanged since there are no holdout samples before it. <b>M2</b> is affected by the combined <b>H0</b>, <b>H1</b>, and <b>H2</b> holdout samples and <b>M4</b> is affected by all holdout samples.</p> | Depth 0 |    |           |  |  |  | Depth INF |  | M0 | H0 | H1 | H2 | M2 | H3 | M4 |
| Depth 0             |                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |    | Depth INF |  |  |  |           |  |    |    |    |    |    |    |    |
| M0                  | H0                  | H1            | H2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | M2      | H3 | M4        |  |  |  |           |  |    |    |    |    |    |    |    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>You can now view the result, which is a holdout with red, green, blue, and alpha channels. Note that the output image is still a deep image.</p> <div>  <b>Note:</b> When disabled, deep samples that coincide with a holdout are removed and everything 'deeper' is also removed. </div> |

# DeepRead

The DeepRead node loads deep images from disk in two formats:

- DTEX (generated from Pixar's PhotoRealistic RenderMan® Pro Server).
- Scanline OpenEXR 3.1.6, or above (tilted OpenEXR 3.1.6, or above, files are not supported).



**Note:** In order to load DTEX files, you need to have Pixar's RenderMan Pro Server 20, or earlier, installed on your machine. You don't need a RenderMan license, however. See Nuke's [online help](#) for more information.

Unlike standard 2D images that contain a single value for each channel of each pixel, deep images contain multiple samples per pixel at varying depths. Each sample contains per-pixel information, such as color, opacity, and camera-relative depth.

See also [DeepWrite](#).

## Inputs and Controls

| Control (UI) | Knob (Scripting) | Default Value | Function |
|--------------|------------------|---------------|----------|
| DeepRead Tab |                  |               |          |

| Control (UI)        | Knob (Scripting)   | Default Value           | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| file                | file               | N/A                     | <p>The image to be loaded from disk. This file should be in:</p> <ul style="list-style-type: none"> <li>• DTEX format, generated from RenderMan Pro Server, or</li> <li>• Scanline OpenEXR 3.1.6 format.</li> </ul> <p>For frame numbers, you can use <b>#</b> for each digit or alternatively, use printf-style formatting (<b>%04d</b>).</p>                                                                                                                                                                                                                                                                                                                                                                                          |
| Localization Policy | localizationPolicy | from auto-localize path | <p>Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times:</p> <ul style="list-style-type: none"> <li>• <b>on</b> - the files are cached, regardless of location, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>from auto-localize path</b> - the files are cached if they reside in the <b>auto-localize from</b> directory, as long as the <b>limit to (GB)</b> limit is not breached.</li> <li>• <b>on demand</b> - only localize these source clips when you manually update them. See <a href="#">Nuke's Online Help</a> for more information.</li> <li>• <b>off</b> - the files are never cached, regardless of location.</li> </ul> |
| Update              | updateLocalization | N/A                     | <p>When this DeepRead node is set to <b>Localization Policy &gt; on demand</b>, click <b>Update</b> to manually localize the files from the source files.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| format              | format             | N/A                     | <p>Set the format of the image file. This is automatically set based on the file header, but you can manually set it to any of the available formats. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| proxy               | proxy              | N/A                     | <p>The location of the proxy image. A proxy image is used if proxy mode is enabled and the required resolution is less than or equal to the file size.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Control (UI) | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| proxy format | proxy_format     | root.proxy_format | The proxy image is read if the format of the lower resolution image is smaller or equal to this. This is automatically set based on the file header but you can manually set it to any of the available formats. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch.                                                                                                                                                                                                                                                         |
| frame range  | first            | N/A               | Sets the first frame in the range of frames to use for the image sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|              | before           | hold              | <p>Sets how the sequence displays before the first frame you've defined.</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - select to show a still picture of the first frame in the frame range.</li> <li>• <b>loop</b> - select to start over and keep looping the span of the frame range before the first frame in the frame range.</li> <li>• <b>bounce</b> - select to play the span of the frame range backwards and forwards between the frame range limits.</li> <li>• <b>black</b> - select to display a black frame before the first frame.</li> </ul> |
|              | last             | N/A               | Sets the last frame in the range of frames to use for the image sequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|              | after            | hold              | <p>Sets how the sequence displays after the last frame you've defined.</p> <ul style="list-style-type: none"> <li>• <b>hold</b> - select to show a still picture of the last frame in the frame range.</li> <li>• <b>loop</b> - select to start over and keep looping the span of the frame range after the last frame in the frame range.</li> <li>• <b>bounce</b> - select to play the span of the frame range backwards and forwards between the frame range limits.</li> </ul>                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>black</b> - select to display a black frame after the last frame.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| frame        | frame_mode       | expression    | <p>By default, Nuke assumes an exact relation between the current frame processed and the frame read in. For example, at frame 15, Nuke reads in image.0015.exr. However, you can change this behavior using this control. For instance, if you have a sequence that runs from image.0500.exr to image.1000.exr, you may want to read in image.0500.exr at frame 1. You can do so in several ways:</p> <ul style="list-style-type: none"> <li>• <b>expression</b> - enter an expression in the field on the right. For example, if your clip begins from image.0500.exr and you want to place this first frame at frame 1 rather than frame 500, you can use the expression <b>frame+499</b>.</li> <li>• <b>start at</b> - enter a start frame number in the field on the right. For example, if your sequence begins from image.0500.exr and you enter 1 in the field, image0500.exr is read in at frame 1. Similarly, if you enter 100 in the field, image0500.exr is read in at frame 100.</li> <li>• <b>offset</b> - enter a constant offset in the field on the right. This constant value is added to the current frame to get the number of the frame that's read in. For example, if your clip begins from image.0500.exr and you want to place this first frame at frame 1 rather than frame 500, you can use <b>499</b> as the constant offset.</li> </ul> |
|              | frame            | N/A           | The expression, start frame, or offset you want to use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               | to alter the relation between the current frame processed and the frame read in.                                                                                                                                                                                                                                                                                                                                                         |
| original range | origFirst        | N/A           | Set the first frame in the frame range you want to use from the input clip. For example, if you set the original range to be from frame 40 to 50, then the DeepRead node indicator in the Dope Sheet only shows that clip as ten frames long. This is for visual reference, rather than a change in what is read in, and it may make it easier to work with many DeepRead nodes in the Dope Sheet.                                       |
|                | origLast         | N/A           | Set the last frame in the frame range you want to use from the input clip. For example, if you set the original range to be from frame 40 to 50, then the DeepRead node indicator in the Dope Sheet only shows that clip as ten frames long. This is for visual reference, rather than a change in what is read in, and it may make it easier to work with many DeepRead nodes in the Dope Sheet.                                        |
| missing frames | on_error         | error         | Sets what to do if there is an error opening the file: <ul style="list-style-type: none"> <li>• <b>error</b> - display an error on the node and in the Viewer at any missing frames.</li> <li>• <b>black</b> - set any missing frames to black.</li> <li>• <b>checkerboard</b> - replace any missing frames with a checkerboard image.</li> <li>• <b>nearest frame</b> - replace any missing frames with their nearest frame.</li> </ul> |
| reload         | reload           | N/A           | Reload the deep image from the disk.                                                                                                                                                                                                                                                                                                                                                                                                     |

dtex Options (These controls are only exposed when loading a .dtex file.)

|      |      |      |                                                                                                                                                                                                                                                                                     |
|------|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| type | type | auto | Sets how to determine the type of <b>.dtex</b> file: <ul style="list-style-type: none"> <li>• <b>auto</b> - Nuke automatically detects the file type by looking at the subimage name. If the name is either <b>Deep Shadow</b> or ends with (or is) <b>.deepopacity</b>,</li> </ul> |
|------|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



| Control (UI)                                                                          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                       |                  |               | <p>Nuke treats the file as a deep opacity file.</p> <ul style="list-style-type: none"> <li>• <b>deepopacity</b> - forces Nuke to treat the file as an accumulated deep opacity file, corresponding to a RenderMan Display Driver configuration of:<br/><br/>Display "Filename.dtex" "deepshad" "deepopacity"</li> <li>• <b>alpha</b> - forces Nuke to treat the file as the newer point-sampled alpha or color, corresponding to a RenderMan Display Driver configuration of either:<br/><br/>Display "Filename.dtex" "deepshad" "a" or<br/><br/>Display "Filename.dtex" "deepshad" "rgba"</li> </ul> |
| discrete                                                                              | discrete         | disabled      | <p>When enabled, Nuke treats the <b>.dtex</b> file as discrete samples, with the front and back being the same.</p> <p>This control is only relevant for deep opacity files, as color deep compositing files are always discrete.</p>                                                                                                                                                                                                                                                                                                                                                                 |
| premultiply                                                                           | premult          | disabled      | <p>When enabled, Nuke premultiplies the values from the <b>.dtex</b> file.</p> <p>When disabled, Nuke assumes the values have already been premultiplied.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| raw values                                                                            | raw              | disabled      | <p>When enabled, deep samples are read "as is", without any processing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>exr Options</b> (These controls are only exposed when loading a <b>.exr</b> file.) |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| do not attach prefix                                                                  | noprefix         | disabled      | <p>When enabled, metadata keys are read as they are, without attaching a prefix to them.</p> <p>When disabled, the prefix <b>exr</b> is attached to metadata keys to make them distinct from other metadata in the tree.</p>                                                                                                                                                                                                                                                                                                                                                                          |

# DeepRecolor

DeepRecolor merges:

- a standard 2D image (**color** input) and
- a deep image file that only contains opacity for each sample (**depth** input).

It spreads the color at each pixel of the **color** input across all the samples of the corresponding pixel in the **depth** input, producing a deep output image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                 |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | color           | A standard 2D image sequence whose channels you want to copy onto a deep image. This should be an unpremultiplied image. If your input image is premultiplied, you can add an <a href="#">Unpremult</a> node between the image and the DeepRecolor node. |
|                 | depth           | A deep image to recolor.                                                                                                                                                                                                                                 |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                        |
|--------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepRecolor Tab    |                  |               |                                                                                                                                                                                                                                                                                 |
| channels           | channels         | rgb           | <p>The channels to copy from the <b>color</b> input.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                                                          |
| target input alpha | targetInputAlpha | disabled      | <p>When disabled, Nuke distributes the color to each sample by unpremultiplying by the <b>color</b> image's alpha and then remultiplying by the alpha of each sample.</p> <p>However, sometimes the alpha from the final high-quality flat render might not match the alpha</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>represented by a given set of deep samples. This could be the result of the compression that usually happens to deep files on disk, or some change to the shader.</p> <p>When <b>target input alpha</b> is enabled, the <b>color</b> input's alpha is distributed amongst the samples so that the final resulting alpha after flattening of the deep data matches the <b>color</b> input's alpha.</p> |

# DeepReformat

DeepReformat is the [Reformat](#) node for deep data. You can use it to set your deep image's dimensions, scale, and so on.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                           |
|-----------------|-----------------|------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image to resize. This can also be a DeepMerge node with merged deep data. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepReformat Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                          |
| type             | type             | to format     | <p>Select how to resize the image:</p> <ul style="list-style-type: none"> <li>• <b>to format</b> - Set the output width and height to the selected format. Choose the format in the <b>output format</b> dropdown menu. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <p>image to the format indicated on the <b>Project Settings</b> dialog.</p> <ul style="list-style-type: none"> <li>• <b>to box</b> - Set the output width and height to dimensions you define (in pixels). Enter values in the <b>width/height</b> and <b>pixel aspect</b> fields to specify the dimensions. This option is useful for creating a thumbnail of the input image.</li> <li>• <b>scale</b> - Set the output width and height to a multiple of the input size. Use the <b>scale</b> slider to define the factor. The scale factor is rounded slightly, so that the output image is an integer number of pixels in the direction chosen under <b>resize type</b>.</li> </ul> |
| output format    | format           | root.format   | <p>The format to which you want to output the deep image sequence. If the format does not yet exist, you can select <b>new</b> to create a new format from scratch. The default setting, <b>root.format</b>, resizes the image to the format indicated in the <b>Project Settings</b>.</p> <p>This control is only available if you have set <b>type</b> to <b>to format</b>.</p>                                                                                                                                                                                                                                                                                                       |
| width/height     | box_width        | 200           | <p>The output width for your deep image. The units are in pixels.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                  | box_height       | 200           | <p>The output height for your deep image. The units are in pixels.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| force this shape | box_fixed        | disabled      | <p>When enabled, the output image matches the <b>width/height</b> fields exactly, even if the original image is a different shape. To achieve this, one direction gets either clipped or padded.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>When disabled, the output image is approximately the same shape as the original, rounded to the nearest integer number of pixels.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| pixel aspect | box_pixel_aspect | 1             | <p>Sets the pixel aspect ratio for the output image.</p> <p>This control is only available if you have set <b>type</b> to <b>to box</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| scale        | scale            | 1             | <p>The scale factor for the width and the height. To scale each direction separately using different scale factors, click the <b>2</b> button.</p> <p>This control is only available if you have set <b>type</b> to <b>scale</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| resize type  | resize           | width         | <p>Choose the method by which you preserve or override the original pixel aspect ratio. Select:</p> <ul style="list-style-type: none"> <li>• <b>none</b> - to not resize the original.</li> <li>• <b>width</b> - to scale the original until its width matches the output width. Height is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>height</b> - to scale the original so that it fills the output height. Width is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>fit</b> - to scale the original so that its smallest side fills the output width or height. The longest side is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>fill</b> - to scale the original so that its longest side fills the output width or height. The smallest side is then scaled in such a manner as to preserve the original aspect ratio.</li> <li>• <b>distort</b> - to scale the original so that both sides fill the output dimensions. This option does not preserve the</li> </ul> |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                           |
|-----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                  |               | original aspect ratio, so distortions may occur.                                                                                                                                   |
| center                | center           | enabled       | <p>When enabled, DeepReformat translates the image to center it in the output.</p> <p>When disabled, DeepReformat translates the image so that the lower left corners line up.</p> |
| flip                  | flip             | disabled      | When enabled, flips the image upside down.                                                                                                                                         |
| flop                  | flop             | disabled      | When enabled, flops the image left and right.                                                                                                                                      |
| turn                  | turn             | disabled      | When enabled, rotates the image 90 degrees counter-clockwise.                                                                                                                      |
| black outside         | black_outside    | disabled      | <p>When enabled, pixels outside the image boundary are set to black.</p> <p>When disabled, the outside area is filled with the outermost pixels of the image area.</p>             |
| preserve bounding box | pbb              | disabled      | <p>When enabled, pixels outside the output format are preserved.</p> <p>When disabled, pixels outside the output format are clipped off.</p>                                       |

# DeepSample

Use this node to sample any given pixel in a deep image. Move the **pos** indicator over pixels in the Viewer to produce deep sample information in the DeepSample control panel.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                           |
|-----------------|-----------------|------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image to sample. This can also be a DeepMerge node with merged deep data. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                        |
|----------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepSample Tab |                  |               |                                                                                                                                                                                                                                 |
| pos x, y       | pos              | 0, 0          | <p>The pixel to sample.</p> <p>You can also set this by moving the <b>pos</b> indicator in the Viewer.</p>                                                                                                                      |
| accumulate     | accumulate       | disabled      | <p>When enabled, DeepSample shows cumulative sample values of the sample pixel (the final composited values as they get built up).</p> <p>When disabled, DeepSample shows the individual sample values of the sample pixel.</p> |
| channels       | channels         | rgba          | <p>The channels to display in the sample list.</p> <p>You can use the checkboxes on the right to select individual channels.</p>                                                                                                |
| [sample list]  | list             | N/A           | <p>The deep samples at the <b>pos</b> pixel. The values shown include:</p> <ul style="list-style-type: none"> <li>• <b>deep.front</b> - The front-most depth value.</li> </ul>                                                  |



| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                  |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>deep.back</b> - The furthestmost depth value.</li> <li>• any channels you've selected using the <b>channels</b> controls.</li> </ul> <p>You can use the right-click menu to copy the currently selected value (<b>Copy</b>) or all values in the table (<b>Copy All</b>).</p> |

# DeepToImage

You can use this node to flatten a deep image - in other words, merge all the samples in a deep image into a regular 2D image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                            |
|-----------------|-----------------|-------------------------------------------------------------------------------------|
| Input           | unnamed         | The deep image to flatten. This can also be a DeepMerge node with merged deep data. |

| Control (UI)           | Knob (Scripting)       | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------|------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepToImage Tab        |                        |               |                                                                                                                                                                                                                                                                                                                                                                               |
| volumetric composition | volumetric_composition | enabled       | <p>When enabled, DeepToImage calculates both the front and back depths of each sample.</p> <p>When disabled, DeepToImage only calculates the front depth of each sample and assumes the samples do not overlap. The calculation takes less time, but if you have overlapping samples in your deep image, the resulting image might not represent every pixel as expected.</p> |

# DeepToPoints

You can use this node to transform the deep pixel samples into points in 3D space that you can see in Nuke's 3D view, like a point cloud. This node is useful for position reference.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                               |
|-----------------|-----------------|----------------------------------------------------------------------------------------|
| Input           | camera          | An optional camera through which you can look at the point cloud.                      |
|                 | deep            | The deep image to view in 3D. This can also be a DeepMerge node with merged deep data. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepToPoints Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| display          | display          | solid         | The display type for the point cloud: <ul style="list-style-type: none"> <li>• <b>off</b> - hides the points.</li> <li>• <b>wireframe</b> - displays only the outlines of the points.</li> <li>• <b>solid</b> - displays all points with a solid color.</li> <li>• <b>solid+wireframe</b> - displays the points as solid color with their outlines.</li> <li>• <b>textured</b> - displays the only the surface texture.</li> <li>• <b>textured+wireframe</b> - displays the wireframe plus the surface texture.</li> </ul> |
| selectable       | selectable       | enabled       | When enabled, you can select the points in the Viewer by clicking on them.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| render           | render_mode      | solid         | Sets how the points will render. This control is independent from the <b>display</b> selection, but has the same settings.                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI) | Knob (Scripting) | Default Value | Function                             |
|--------------|------------------|---------------|--------------------------------------|
| Point detail | detail           | 0.25          | Sets the density of the point cloud. |
| Point size   | pointSize        | 2             | Sets the size of the points.         |

# DeepTransform

You can use this node to reposition deep data. It allows you to:

- translate the samples along the x, y, and z axes, and
- scale the samples' Z depth values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| Input           | mask            | An optional image to use as a mask. The z translate and z scale effects are limited to the non-black areas of the mask. |
|                 | deep            | The deep image to transform. This can also be a DeepMerge node with merged deep data.                                   |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------|
| DeepTransform Tab |                  |               |                                                                                                                         |
| translate x, y, z | translate        | 0, 0, 0       | Moves all samples at each pixel along the x, y, and z axes.                                                             |
| zscale            | zscale           | 1             | Scales the z depth of all samples at each pixel. Values above 1 decrease the depth, whereas values below 1 increase it. |
| mask              | N/A              | enabled       | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel            |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                              |
|--------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------|
|              |                  |               | to <b>none</b> .                                                                                                      |
|              | mask_channel     | rgba.alpha    | The channel to use as a mask. The z translate and z scale effects are limited to the non-black areas of this channel. |

# DeepWrite

This node renders the result of all upstream deep nodes and saves the result to disk in the scanline OpenEXR 3.1.6 format (tiled OpenEXR files are not supported).

Note that this node executes all renders at the currently active scale: either full- or proxy-resolution. To toggle between these, press **Ctrl/Cmd+P**.

See also [DeepRead](#).

## Inputs and Controls

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                                                                  |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DeepWrite Tab |                  |               |                                                                                                                                                                                           |
| channels      | channels         | rgba          | Sets the channels to render.<br><br>If you set this to something other than <b>all</b> or <b>none</b> , you can use the controls on the right to select individual channels.              |
| file          | file             | none          | Sets the file path and name of the file to render.                                                                                                                                        |
| proxy         | proxy            | none          | Sets the file path and name of a relevant proxy image. This proxy image is used if <b>proxy</b> mode is on and the required resolution is less than or equal to the <b>proxy format</b> . |
| frame         | frame_mode       | expression    | Sets the frame mode:                                                                                                                                                                      |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>expression</b> - Lets you enter an expression in the field on the right. The expression changes the relation between the currently processed frame and the numbering of the frame written out. The resulting file name for the current frame is displayed on the DeepWrite node in the Node Graph. For example, if your deep clip begins from frame 500 and you want to name that frame image.0001.exr rather than image.0500.exr, you can use the expression <b>frame-499</b>. This way, 499 frames are subtracted from the current frame to get the number for the frame written out. Frame 500 is written out as image.0001.exr, frame 501 is written out as image.0002.exr, and so on. Another example of an expression is <b>frame*2</b>. This expression multiplies the current frame by two to get the number of the frame that's written out. At frame 1, image.0002.exr is written out; at frame 2, image.0004.exr is written out; at frame 3, image.0006.exr is written out; and so on.</li> <li>• <b>startat</b> - Lets you enter a start frame number in the field on the right. This specifies the frame number given to the first frame in the sequence. The numbering of the rest of the frames is offset accordingly. For example, if your sequence begins from frame 500 and you enter <b>1</b> in the field, frame 500 is written out as image.0001.exr, frame 501 as image.0002.exr, and so on. Similarly, if you enter <b>100</b> in the field, frame 500 is written out as image.0100.exr.</li> <li>• <b>offset</b> - Lets you enter a constant offset in the field on the right. This constant value is added to the current frame to get the number for the frame that's written out. For example, if your clip begins from frame 500 and you want to render this first</li> </ul> |

| Control (UI)                                                                               | Knob (Scripting) | Default Value                        | Function                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------|------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                            |                  |                                      | frame as image.0001.exr rather than image.0500.exr, you can use <b>-499</b> as the constant offset. This way, 499 is subtracted from the current frame to get the number for the frame that's written out. At frame 500, image.0001.exr is written out; at frame 501, image.0002.exr is written out, and so on.                                          |
|                                                                                            | frame            | none                                 | Depending on the <b>frame</b> mode, you can enter a start frame, an offset, or an expression here.                                                                                                                                                                                                                                                       |
| views                                                                                      | views            | <b>dependent on Project Settings</b> | When you're working with stereo footage, select the required view to render.                                                                                                                                                                                                                                                                             |
| file type                                                                                  | file_type        | none                                 | Sets the rendered file format manually, enabling type-specific controls.                                                                                                                                                                                                                                                                                 |
|                                                                                            |                  |                                      | <div>  <b>Note:</b> If <b>file type</b> is left blank, Nuke disables any file-type-specific controls. </div>                                                                                                                                                          |
| exr Options (These controls are only exposed when <b>file type</b> is set to <b>exr</b> .) |                  |                                      |                                                                                                                                                                                                                                                                                                                                                          |
| datatype                                                                                   | datatype         | 16 bit half                          | Sets the bit depth of the rendered <b>.exr</b> files: <ul style="list-style-type: none"> <li>• 16-bit half</li> <li>• 32-bit float</li> </ul>                                                                                                                                                                                                            |
| compression                                                                                | compression      | Zip (1 scanline)                     | Sets the compression type to apply to the rendered file.                                                                                                                                                                                                                                                                                                 |
| metadata                                                                                   | metadata         | default metadata                     | Determines what metadata is included with the rendered file: <ul style="list-style-type: none"> <li>• <b>no metadata</b> - No custom attributes are created, and only metadata that fills required header fields is written out.</li> <li>• <b>default metadata</b> - The optional timecode, edgecode, frame rate, and exposure header fields</li> </ul> |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                   |               | <p>are also filled using metadata values.</p> <ul style="list-style-type: none"> <li>• default metadata and exr/*</li> <li>• all metadata except input/*</li> <li>• all metadata</li> </ul>                                                                                                         |
| do not attach prefix                                                                                                                                   | noprefix          | disabled      | <p>When enabled, unknown metadata keys are written into the file as they are.</p> <p>When disabled, unknown metadata keys have the prefix <b>nuke</b> attached to them when they are written into the file.</p>                                                                                     |
| render order                                                                                                                                           | render_order      | 1             | When multiple nodes are rendered at once, they are sorted into increasing order by this number.                                                                                                                                                                                                     |
| Render                                                                                                                                                 | Render            | N/A           | Click to display the pre-Render setup window.                                                                                                                                                                                                                                                       |
| frame range                                                                                                                                            | first             | 1             | Sets the first frame of a sequence to render.                                                                                                                                                                                                                                                       |
|                                                                                                                                                        | last              | 1             | Sets the last frame of a sequence to render.                                                                                                                                                                                                                                                        |
| limit to range                                                                                                                                         | use_limit         | disabled      | <p>When enabled, only frames within the <b>frame range</b> are rendered.</p> <div>  <b>Note:</b> If the specified frames are outside the sequence range, the DeepWrite node behaves as if it is disabled. </div> |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                     |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                        |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception,                                                                                                                                                                                               |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                             |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | the render aborts.                                                                                                                                   |
| after each frame | afterFrameRender | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render     | afterRender      | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress  | renderProgress   | none          | These functions run during rendering to determine progress or failure.                                                                               |



# Views Nodes

Views nodes deal with stereoscopic or multi-view compositing.

## Anaglyph

If you’re working on a stereoscopic or multi-view project, you can use this node to convert your input into an anaglyph image. By default, the left input is filtered to remove blue and green, and the right view to remove red.

Anaglyph images produce a 3D effect when viewed with two-color anaglyph glasses.

See also [MixViews](#) and [SideBySide](#).

### Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>The image you want to convert into an anaglyph image. This input needs to contain at least two views, one for the left eye and another for the right eye:</p> <ul style="list-style-type: none"><li>• If your input is an <b>.exr</b> file, the file may already contain both views. This is because <b>.exr</b> files support multiple views in a single file.</li><li>• With any other file types, you need to have separate files for the left and right views. You can combine these files into a single input using a <b>JoinViews</b> node.</li></ul> |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Anaglyph Tab      |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| views             | views            | N/A           | The views to use for the left and the right eye.                                                                                                                                                                                                                                                                                                                                                                        |
| amtcolor          | amtcolour        | 0             | <p>By default, Anaglyph converts the input images into grayscale images. To add color into the images, select a value between 0 (grayscale) and 1 (colored) here.</p> <div>  <b>Note:</b> If the images include areas that are very red, green, or blue, adding more color into them may not produce the best possible results. </div> |
| (right=red)       | swap             | disabled      | When enabled, the colors are inverted so that the red channel is used from the right input and the blue and green channels from the left.                                                                                                                                                                                                                                                                               |
| horizontal offset | offset           | 0             | Sets where the images appear in relation to the screen when viewed with anaglyph glasses. To have the images appear in front of the screen, you would usually enter a negative value. To have the images appear further away, you would usually enter a positive value. (This is not the case if you have swapped the left and right views around.)                                                                     |

# JoinViews

If you have separate files for the views that exist in your **Project Settings** (for example, one file for the left view and another for the right), JoinViews lets you combine these files into a single output. This can be useful if:

- You want to perform the same actions on all views. By default, Nuke applies any changes you make to all views of the processed node.
- Your subsequent nodes (for example, [Split and Join](#)) require a single input that contains two views.

See also [Split and Join](#) and [OneView](#).

## Inputs and Controls

| Connection Type | Connection Name                                                          | Function                                                 |
|-----------------|--------------------------------------------------------------------------|----------------------------------------------------------|
| Input           | There's one input for each view defined in the <b>Project Settings</b> . | The views that you want to combine into a single output. |

## MixViews

If you're working on a stereoscopic or multi-view project, you can use this node to display a blend between two views in the Viewer. This allows you to check how elements in these views are aligned.

See also [Anaglyph](#) and [SideBySide](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>The image that contains the two views you want to dissolve between:</p> <ul style="list-style-type: none"> <li>• If your input is an <b>.exr</b> file, the file may already contain both views. This is because <b>.exr</b> files support multiple views in a single file.</li> <li>• With any other file types, you need to have separate files for the left and right views. You can combine these files into a single input using a JoinViews node.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function |
|--------------|------------------|---------------|----------|
| MixViews Tab |                  |               |          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                   |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| views        | views            | N/A           | The two views to blend between.                                                                                                                                            |
| mix          | mix              | 0             | Adjust the blend between the views. Setting this to 0 or 1 displays only one of the views. Values between 0 and 1 produce a gradual transition from one view to the other. |

# OneView

OneView lets you separate one view for processing. This is useful if you need to perform different actions on different views, for example if you want to color correct one view but not the other. Any changes you make using subsequent nodes are only applied to the extracted view (regardless of what view you are displaying in the Viewer).

If you want to perform the same action on both views but use different values for each, you can split the view off in the node's controls instead.

To merge the views back together further down the node tree, use the [JoinViews](#) node.

See also [Split and Join](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                              |
|-----------------|-----------------|-----------------------------------------------------------------------|
| Input           | unnamed         | The image that contains the view you want to separate for processing. |

| Control (UI) | Knob (Scripting) | Default Value | Function             |
|--------------|------------------|---------------|----------------------|
| OneView Tab  |                  |               |                      |
| view         | view             | N/A           | The view to extract. |

# ReConverge

If you're working on a stereoscopic or multi-view project, the ReConverge node lets you shift convergence (the inward rotation of the eyes or cameras) so that any selected point in the image appears at screen depth when viewed with 3D glasses. This point is called the **convergence point**. It is the point where the lines of sight from the two cameras meet.

At the convergence point, the different views in the image are aligned and appear at screen depth when viewed with 3D glasses. Anything behind the convergence point appears behind the screen, while anything in front of it seems to pop out of the screen.

To calculate the convergence shift, the ReConverge node needs a disparity field that maps the location of a pixel in one view to the location of its corresponding pixel in the other view. To create the disparity field, you can use O\_DisparityGenerator plug-in, which is part of the Ocula plug-in set. Alternatively, you can create the disparity field in a 3D application. Once you have the disparity field, you can store it in the channels of an .exr file, or use the [Shuffle](#) node to add the disparity channels in the data stream where you need them.

It is also possible to use the same element as the convergence point throughout the image sequence. To do so, link the ReConverge node with a [Tracker](#) node.

To better view the effect of the ReConverge node, you can insert an [Anaglyph](#) node between the ReConverge node and the Viewer.



**Note:** The ReConverge node only shifts views horizontally, not vertically.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>The image whose convergence you want to adjust. This input should contain at least two views (one for the left eye and another for the right) and a disparity field:</p> <ul style="list-style-type: none"> <li>If your input is an <b>.exr</b> file, the file may already contain both views. This is because .exr files support multiple views in a single file. With</li> </ul> |

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                 | <p>any other file types, you need to have separate files for the left and right views. You can combine these files into a single input using a JoinViews node.</p> <ul style="list-style-type: none"> <li>• Make sure there is a disparity field upstream from the image sequence. If the image sequence is an .exr file, the disparity field can be included in its channels. Otherwise, you can use a Shuffle node or Ocula's O_DisparityGenerator plug-in to add it in the data stream.</li> </ul> |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                   |
|--------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ReConverge Tab     |                  |               |                                                                                                                                                                                                                                                            |
| Converge upon xy   | convergencepoint | 0, 0          | <p>The x and y coordinates of the convergence point (the point you want to appear at screen level when viewed with 3D glasses).</p> <p>You can also move the point by dragging the convergence point overlay in the Viewer.</p>                            |
| Convergence offset | offset           | 0             | Adjusts the offset for convergence (in pixels). To bring all elements of your image forward from the screen level, enter a positive value. To move all elements further away, enter a negative value.                                                      |
| Mode               | convergemode     | shift right   | <p>The view to move to achieve the convergence shift:</p> <ul style="list-style-type: none"> <li>• <b>shift right</b> - move the right view.</li> <li>• <b>shift left</b> - move the left view.</li> <li>• <b>shift both</b> - move both views.</li> </ul> |

# ShuffleViews

You can use this node to rearrange the views in your script. For example, you can swap the left and right views around in the pipeline, so that Nuke uses the left input for the right eye and vice versa.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                 |
|-----------------|-----------------|----------------------------------------------------------|
| Input           | unnamed         | The image that contains the views you want to rearrange. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ShuffleViews Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| views to use     | views            | N/A           | <ol style="list-style-type: none"> <li>1. Click <b>add</b> to add rows of controls to the control panel, or <b>delete</b> to remove unnecessary rows.</li> <li>2. Use the buttons or dropdown menus to select which view to replace with which. For example, to swap the left and right views around, you need to make the following selections: <ul style="list-style-type: none"> <li>• On one row, select left under <b>get</b>, and right under <b>from</b> ("get left from right"). The left view is now replaced with the right view.</li> <li>• On another row, select right under <b>get</b>, and left under <b>from</b> ("get right from left").</li> </ul> </li> </ol> |

## SideBySide

If you're working on a stereoscopic or multi-view project, you can use this node to display two views next to each other in the Viewer.

See also [Anaglyph](#) and [MixViews](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>The image that contains the two views you want to display side by side:</p> <ul style="list-style-type: none"> <li>• If your input is an <b>.exr</b> file, the file may already contain both views. This is because <b>.exr</b> files support multiple views in a single file.</li> <li>• With any other file types, you need to have separate files for the left and right views. You can combine these files into a single input using a JoinViews node.</li> </ul> |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                   |
|----------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------|
| SideBySide Tab |                  |               |                                                                                                                            |
| vertical       | vertical         | disabled      | <p>Enable this to display one view on top of another.</p> <p>Disable this to display the two views next to each other.</p> |
| view1          | view1            | N/A           | Select the view to display on the left (or the top if you have checked <b>vertical</b> ).                                  |
| view2          | view2            | N/A           | Select the view to display on the right (or the bottom if you have checked <b>vertical</b> ).                              |
| swap           | swap             | N/A           | Swaps the views around in the Viewer.                                                                                      |

## Split and Join

Split and Join is a combination of [OneView](#) and [JoinViews](#) nodes. It allows you to extract all the views in your **Project Settings**, process them individually, and then merge them back together. It's no different to using several OneView nodes together with a JoinViews node, but it makes working faster because you do not need to add each node separately.



Once you've used Split and Join, you can add any necessary nodes, such as color corrections, between the OneView and JoinViews nodes.

# Metadata Nodes

Metadata nodes deal with information embedded in your images, such as the image's original bit depth, width, and height.

## AddTimeCode

Adds a time code to the metadata passed down from an input node. The default settings add the time code 01:00:00:00 to the first frame. This time code is updated throughout the frame range according to the input clip's playback speed, which in turn is controlled by the **fps** (frames per second) control in the **Project Settings**. If you change the **fps** value in the **Project Settings**, the time code in the metadata is updated to reflect the change.

### Inputs and Controls

| Connection Type | Connection Name | Function                                       |
|-----------------|-----------------|------------------------------------------------|
| Input           | unnamed         | The node to receive the time code information. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TimeCode Tab |                  |               |                                                                                                                                                                                    |
| startcode    | startcode        | 01:00:00:00   | Enter the time code value to add to the first frame of the input.                                                                                                                  |
| fps          | fps              | 24            | If you want to specify the playback speed manually rather than get it from the <b>Project Settings</b> , disable <b>get FPS from metadata</b> and enter a new value in this field. |
| get FPS      | metafps          | enabled       | By default, frames per second is read from the input's                                                                                                                             |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                        |
|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| from metadata    |                  |               | playback speed, which is controlled by the <b>Project Settings</b> . If you want to override the value in the input, disable this control and enter the required value in the <b>fps</b> field. |
| start frame      | frame            | 1             | If you want to specify a different start frame than the first frame, enable <b>use start frame?</b> and enter a new value in this field.                                                        |
| use start frame? | useFrame         | disabled      | By default, the start frame is always 1. If you want to override this value, enable this control and enter the required frame in the <b>start frame</b> field.                                  |

# CompareMetaData

Connecting nodes to the CompareMetaData node enables you to quickly determine metadata differences between files. The CompareMetaData node only shows keys and values where there are differences between the two inputs. For example, if you were having trouble with QuickTime frame rates, you could connect up two QuickTime files and immediately see differences between the **input/frame\_rate** key values.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | A               | The first node whose metadata you want to compare.  |
|                 | B               | The second node whose metadata you want to compare. |

| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                |
|---------------------|------------------|---------------|-----------------------------------------------------------------------------------------|
| CompareMetaData Tab |                  |               |                                                                                         |
| metadata viewer     | metadata         | N/A           | Displays the differences between the metadata of any two nodes connected to the inputs. |

# CopyMetaData

This node copies metadata from one image to another, filtering the metadata to exclude some keys if required.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                |
|-----------------|-----------------|---------------------------------------------------------|
| Input           | Meta            | The node whose metadata you want to copy to the output. |
|                 | Image           | The node whose image you want to pass down the tree.    |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CopyMetaData Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| metadata from    | mergeMode        | Image + Meta  | <p>Set the image and metadata combination you intend to pass down the tree:</p> <ul style="list-style-type: none"> <li>• <b>Image+Meta</b> - add the metadata from the Meta input to the meta- data from the Image input. If the inputs share any common metadata keys, the values taken from the Meta input override those taken from the Image input.</li> <li>• <b>Meta only</b> - only use the metadata from the Meta input.</li> <li>• <b>Meta+Image</b> - add the metadata from the Image input to the meta- data from the Meta input. If the inputs share any common metadata keys, the values taken from the Image input override those taken from the Meta input.</li> <li>• <b>Image only</b> - only use the metadata from the</li> </ul> |

| Control (UI)    | Knob (Scripting)        | Default Value   | Function                                                                                                                                                                                                                                                                    |
|-----------------|-------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                         |                 | Image input. This produces the same result as not using a CopyMetaData at all: both the image and metadata are taken from the Image input. This option can be useful if you want to filter the metadata passed down the tree.                                               |
| Meta copy only  | metadatafilter          | N/A             | <p>Enter search criteria to select the metadata to copy from the Meta input.</p> <p>For example, if you enter <b>f</b> in the copy only field under <b>Meta filtering</b>, only the keys and values that include the letter <b>f</b> are copied from the Meta input.</p>    |
| within          | metadatafilterMode      | keys and values | <p>Limit the metadata you want to pass down the tree to certain fields:</p> <ul style="list-style-type: none"> <li>• keys and values</li> <li>• keys only</li> <li>• values only</li> </ul>                                                                                 |
| Image copy only | imageMetadatafilter     | N/A             | <p>Enter search criteria to select the metadata to copy from the Image input.</p> <p>For example, if you enter <b>f</b> in the copy only field under <b>Image filtering</b>, only the keys and values that include the letter <b>f</b> are copied from the Image input.</p> |
| within          | imageMetadatafilterMode | keys and values | <p>Limit the metadata you want to pass down the tree to certain fields:</p> <ul style="list-style-type: none"> <li>• keys and values</li> </ul>                                                                                                                             |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                             |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• keys only</li> <li>• values only</li> </ul> |

# ModifyMetaData

The ModifyMetaData node enables you to add, edit, or remove the metadata associated with a file.

## Inputs and Controls

| Connection Type | Connection Name | Function                                    |
|-----------------|-----------------|---------------------------------------------|
| Input           | unnamed         | The node whose metadata you want to modify. |

| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ModifyMetaData Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| metadata viewer    | metadata         | N/A           | <ol style="list-style-type: none"> <li>1. First add, remove, and reorder metadata placemarkers using the +/- and up/down arrow buttons.</li> <li>2. Double-click the <b>key</b> field in the placemaker to select the metadata you want to edit or remove. The <b>Pick metadata key</b> dialog opens. If you want to add metadata, simply enter a new key name in the field at the bottom of this dialog.</li> <li>3. Double-click the <b>action</b> field in the placemaker to toggle the operation between <b>set</b> and <b>remove</b>.</li> <li>4. If you want to add or edit metadata, double-click the <b>value</b> field in the placemaker and enter a new value for the selected key.</li> </ol> |

# ViewMetaData

ViewMetaData lets you inspect metadata (such as the image's original bit depth, width, and height) passed down by an input node. The data is split into two columns, **keys** and the **values** associated with them.

## Inputs and Controls

| Connection Type | Connection Name | Function                                     |
|-----------------|-----------------|----------------------------------------------|
| Input           | unnamed         | The node whose metadata you want to inspect. |

| Control (UI)        | Knob (Scripting)   | Default Value   | Function                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ViewMetaData Tab    |                    |                 |                                                                                                                                                                                                                                                                                                                                         |
| metadata viewer     | shownmetadata      | N/A             | Displays the metadata of any node connected to the input. Once you know which keys exist on the input, you can reference them in expressions.<br><br>The metadata displayed depends on input file type. For example, a JPEG might only contain <b>input/</b> keys, whereas QuickTimes contain <b>input/</b> and <b>quicktime/</b> keys. |
| search metadata for | metadatafilter     | N/A             | Filter the metadata by entering text in this field. By default, only metadata containing the <b>keys</b> and <b>values</b> entered are displayed. You can change this behavior using the <b>within</b> control.                                                                                                                         |
| within              | metadatafiltermode | keys and values | Defines how to filter the search metadata for control. You can search <b>keysandvalues</b> , <b>keysonly</b> , or <b>valuesonly</b> .                                                                                                                                                                                                   |

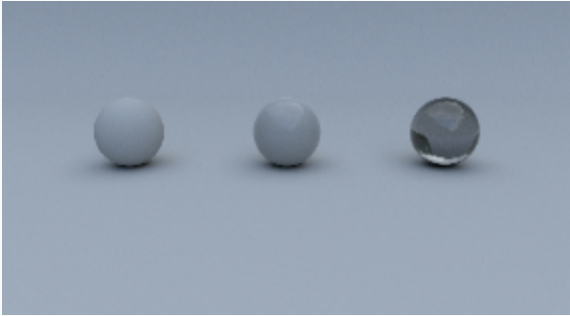
# ToolSets Nodes

Tool sets deal with custom tools created in Nuke. You can create your own ToolSets from scratch or modify the existing 2D and 3D examples that ship with Nuke. The example scripts also contain a link to footage you can download to use with the examples:

[http://thefoundry.s3.amazonaws.com/products/nuke/toolsets/toolset\\_examples.zip](http://thefoundry.s3.amazonaws.com/products/nuke/toolsets/toolset_examples.zip)

## 2D ToolSets

Nuke ships with the following 2D ToolSets:

| ToolSet      | Description                                                                                                                                                                                                                                                                                                         | Result                                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| CG_Beauty    |                                                                                                                                                                                                                                                                                                                     |                                                                                      |
| TB_CG_Beauty | A basic approach to splitting out and merging back together several layers from multi-channel EXRs using some common third-party renderers, such as Arnold, Modo, and RenderMan.                                                                                                                                    |   |
| Keying       |                                                                                                                                                                                                                                                                                                                     |                                                                                      |
| TK_Keying    | An example of combining different keys from blue or greenscreen footage to produce a better matte. This ToolSet creates a key for the edges of the alpha channel, ignoring fine detail, and then combines it with a hard, core matte. Finally the edges are keyed separately, masked, and combined with the result. |  |

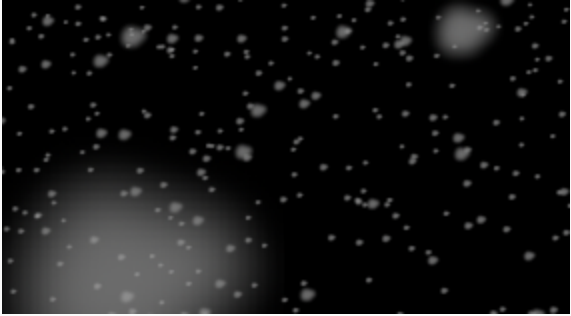


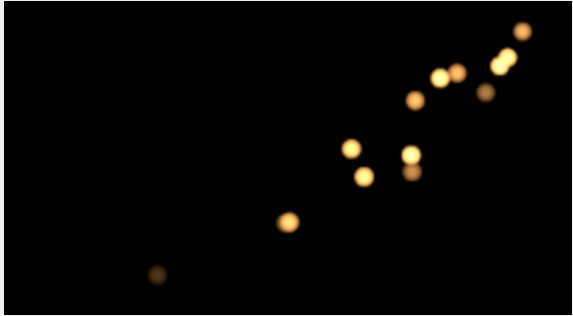
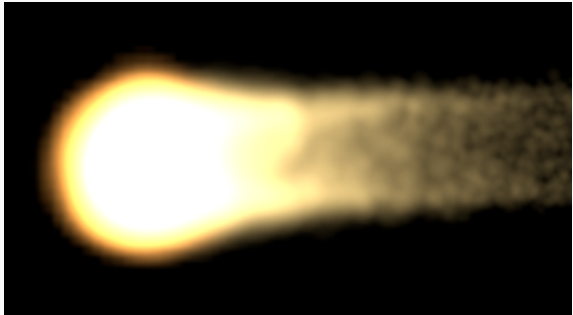
| ToolSet             | Description                                                                                                                                                                                             | Result                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| SmartPaint          |                                                                                                                                                                                                         |                                                                                      |
| TSVSmartVectorFix   | An example of rendering vectors for a plate and then using VectorDistort to warp the source. An example image is then merged on top of the source.                                                      |    |
| TSVSmartVectorGrade | An example of rendering vectors for a plate and then using VectorDistort to warp a black and white mask over the source. The warped mask is then used to grade the original plate.                      |    |
| TSVSmartVectorSTMap | An example of writing the results of a SmartVector to disk as an STMap sequence to save processing time. This STMap can then be used throughout the shot as needed, rather than recalculating the warp. |  |

## 3D ToolSets

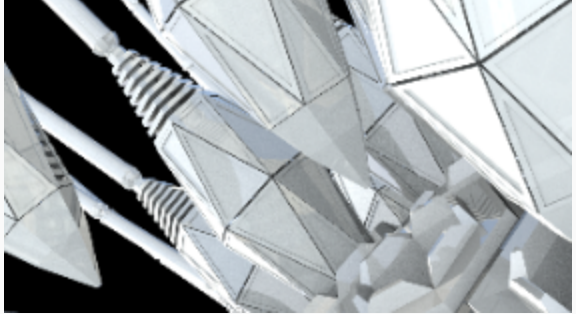
Nuke ships with the following 3D ToolSets:

| ToolSet   | Description | Result |
|-----------|-------------|--------|
| Particles |             |        |

| ToolSet    | Description                                                                                                                                                                                                                                                                                  | Result                                                                               |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| P_DustHit  | <p>Creates an adjustable dust particle system. Double-click the particle system to open its <b>Properties</b> panel and then click the <b>S</b> icon to display the contents of the group.</p> <p>The image shows the 3D particle system rendered through a ScanlineRender node.</p>         |    |
| P_FogBox   | <p>Creates an adjustable fog particle system. Double-click the particle system to open its <b>Properties</b> panel and then click the <b>S</b> icon to display the contents of the group.</p> <p>The image shows the 3D particle system rendered through a ScanlineRender node.</p>          |   |
| P_SnowRain | <p>Creates an adjustable snow or rain particle system. Double-click the particle system to open its <b>Properties</b> panel and then click the <b>S</b> icon to display the contents of the group.</p> <p>The image shows the 3D particle system rendered through a ScanlineRender node.</p> |  |

| ToolSet                    | Description                                                                                                                                                                                                                                                                     | Result                                                                                                                                                                                                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P_Sparks                   | <p>Creates an adjustable trail of sparks. Double-click the particle system to open its <b>Properties</b> panel and then click the <b>S</b> icon to display the contents of the group.</p> <p>The image shows the 3D particle system rendered through a ScanlineRender node.</p> |  A black and white image showing a trail of sparks. The sparks are represented as a series of small, bright, glowing spheres arranged in a curved, upward-sloping path against a dark background.                                          |
| P_Trail                    | <p>Creates an adjustable comet effect. Double-click the particle system to open its <b>Properties</b> panel and then click the <b>S</b> icon to display the contents of the group.</p> <p>The image shows the 3D particle system rendered through a ScanlineRender node.</p>    |  A black and white image showing a comet effect. It features a large, bright, glowing sphere on the left, with a long, diffuse, and slightly curved trail of smaller, glowing particles extending to the right against a dark background. |
| Projection and Rig Removal |                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                              |
| TP_RRCleanProject          | <p>An example showing painting out the rig on a single frame, projecting the paint onto 3D geometry and rendering it through the moving scene camera, and then merging the correction back over the source plate.</p>                                                           |  A color image of a desert landscape. A paved road stretches from the foreground into the distance, flanked by dry, scrubby vegetation. In the far distance, a small red car is visible on the road. The sky is clear and blue.          |
| TP_RRCleanTexture          | <p>An example showing projecting a single frame through a static camera onto geometry,</p>                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                              |

| ToolSet              | Description                                                                                                                                                                                                                            | Result |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
|                      | 'unprojecting' that frame to the geometry's UV space to remove perspective, painting the correction and reapplying it to the geometry through the moving scene camera. The correction is then merged back over the source plate.       |        |
| TP_RRExistingProject | An example showing projecting an existing clean frame through a camera onto 3D geometry, rendering it through the moving scene camera, and then merging the correction back over the source plate.                                     |        |
| TP_RRExistingTexture | An example applying a pre-existing clean texture to 3D geometry, rendering it through the moving scene camera, and then merging the texture back over the source plate.                                                                |        |
| TP_RRPlanarTrack     | An example showing creating a cleaned frame using a RotoPaint node, tracking a plane using the Roto node's <b>Tracking</b> tab, and then using the resultant CornerPin node to track this frame into place across the entire sequence. |        |
| Relighting           |                                                                                                                                                                                                                                        |        |

| ToolSet       | Description                                                                                                                                         | Result                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| TR_Relighting | An example script showing the creation of a point cloud from a position pass, which is then used to relight the 2D image from 3D light information. |  |

## Create

Creates a node tool set in the Nuke toolbar. This can be useful if you find yourself creating the same set of nodes repeatedly. Once you have created a tool set, you can easily create the nodes that it contains by selecting it in the **ToolSets** menu (rather than creating each node separately).

To create a tool set, select the nodes you want to include in the Node Graph and click **ToolSets > Create**. In the **Create ToolSet** dialog that appears, use the **ToolSets menu** to select the menu where you'd like to place your new tool set. Then give it a name in the **Menu item** field and click **Create**.

By default, your new tool set goes under the **ToolSets** menu, but if you'd like to create a subfolder for the tool set, you can do that by specifying the folder name before the tool set name, separated by a forward slash, in the **Menu item** field. For example, entering **Roto/BasicRoto** would create a subfolder called **Roto** in the **ToolSets** menu, and place a new tool set by the name of BasicRoto in it.

Like gizmos, tool sets can be shared between artists if they are using a centralized .nuke folder. This needs to be accessed through a NUKE\_PATH environment variable that you can set up.

See also [Delete](#).

## Delete

Allows you to delete a tool set you've created earlier. Simply click **ToolSets > Delete** in the toolbar and select the tool set you want to remove. A dialog displays asking you to confirm the removal. Click **Yes**.

See also [Create](#).

# Other Nodes

Other nodes contain additional nodes for script and Viewer management.

## Assert

You can use this node to test the validity of a Tcl expression. If the expression resolves to false, this node raises an error.

The Assert node does not alter the input image in any way.

For more information on Tcl expressions, see Nuke's [online help](#) or select **Help > Documentation > Knob Math Expressions** in Nuke.

## AudioRead

You can use this node to read in an audio file and view it in the Curve Editor and Dope Sheet in order to line up keyframes of your composition with the waveform of the sound. You can then flipbook the audio with your footage to preview your comp with sound.

### Inputs and Controls

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                              |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------|
| AudioRead Tab |                  |               |                                                                                                       |
| file          | file             | N/A           | Sets the file path of the audio file you're reading in. This can be an uncompressed WAV or AIFF file. |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                              |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| time range      | begintime        | 0, 0          | Sets the start and end times for the audio in Nuke.                                                                                                                   |
| file time range | filebegintime    | 0, 0          | Sets the start and end times of the audio file read in. These are automatically set to the values in the file, but you can change them to trim the data used in Nuke. |
| reload          | reload           | N/A           | Click to refresh the read buffer.                                                                                                                                     |
| ratesource      | ratesource       | file          | Sets the source for the sample rate. File reads the rate from the audio file, custom lets you specify a custom rate in the rate field.                                |
| rate            | rate             |               | Sets the sample rate of the audio clip.                                                                                                                               |
| curves          |                  |               |                                                                                                                                                                       |
| left            | left             | 0             | Adjusts the left level on the current frame.                                                                                                                          |
| right           | right            | 0             | Adjusts the right level on the current frame.                                                                                                                         |
| key interval    | keyinterval      | 0             | Sets the key interval you want to use when creating the curves.                                                                                                       |
| generate        | generate         | N/A           | Click to generate the audio data as a curve that you can use in the Curve Editor and Dope Sheet.                                                                      |

# Backdrop

This node visually groups nodes in the Node Graph. Inserting a Backdrop node creates a box behind the nodes. When you move the box, all the nodes that overlap the box are moved too. By inserting several Backdrop nodes, you can group the nodes in your node tree onto boxes of different colors and titles. This makes it easier to find a particular node in a large node tree, for example.

You can also use the **Z Order** control in the **Properties** panel to layer-up Backdrop nodes. Backdrops with lower **Z Order** values appear underneath those with a higher value.

See also [StickyNote](#).

# BlinkScript

The BlinkScript node runs Foundry's Blink framework enabling us to write our code once and run it on any supported device. This is achieved through code translation, in which the Blink code is turned into specific code for each target device. Code is generated and compiled on-the-fly, allowing you to switch between devices at will.

BlinkScript runs a Blink "kernel" over every pixel in the output, where a Blink kernel is similar to a C++ class, but with some special parameter types and functions. Through translation, the code in the BlinkScript node can be turned into normal C++ or SIMD code for the CPU, or OpenCL for the GPU.

The Blink framework streamlines plug-in development workflow significantly, as you no longer have to exit Nuke to compile your code.



**Note:** To use the GPU when rendering from the command line, add `--gpu` to your command. For more information on GPU support, see the [Release Notes](#) for your version of Nuke.

You can publish kernels in Group nodes which can then be saved as gizmos, if required. Published kernels can be encoded to protect your IP using BlinkScript's built-in kernel protection. Protected kernels are not readable when the published node is saved to a script.



**Warning:** BlinkScript is very flexible, as there are no restrictions on the code you can write within a kernel. As a result, code compiled from the Kernel Source can cause Nuke to crash, so please use caution!

## Inputs and Controls

| Connection Type | Connection Name | Function                                              |
|-----------------|-----------------|-------------------------------------------------------|
| Input           | src             | The image to which the BlinkScript kernel is applied. |



| Control (UI)          | Knob (Scripting)       | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BlinkScript Tab       |                        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Kernel File           | kernelSourceFile       | none             | Sets the file path of the kernel used for <b>Load</b> and <b>Save</b> operations. BlinkScript kernels use the <b>.rpp</b> file extension.                                                                                                                                                                                                                                                                                                                                                         |
| Load                  | reloadKernelSourceFile | N/A              | Click to load and compile the kernel specified in the <b>Kernel File</b> field.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Save                  | saveKernelFile         | N/A              | Click to save the current kernel to the location and file name specified in the <b>Kernel File</b> field.                                                                                                                                                                                                                                                                                                                                                                                         |
| Clear                 | clearKernelSource      | N/A              | Click to clear the Kernel Editor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Recompile             | recompile              | N/A              | Click to recompile the kernel currently in the Kernel Editor. Any compile errors present are displayed on screen.                                                                                                                                                                                                                                                                                                                                                                                 |
| Kernel Source         |                        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Kernel Editor         | kernelSource           | SaturationKernel | <p>Enter the kernel you intend to compile or edit the default SaturationKernel to suit your purposes.</p> <p>Click the <b>Recompile</b> button to see the result of any changes.</p>                                                                                                                                                                                                                                                                                                              |
| Kernel Parameters Tab |                        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Local GPU             | gpuName                | N/A              | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div>                                                                                                                                                                                                                                    |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Vectorize on CPU     | vectorize         | enabled       | <p>When enabled, use SIMD instructions on the CPU where possible.</p> <div>  <b>Note:</b> This is currently an experimental feature and vectorization might fail for some valid Blink kernels. </div>                                                                                                                                                                                                                                                                                                                       |

| Control (UI)          | Knob (Scripting)            | Default Value                        | Function                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|-----------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Saturation            | SaturationKernel_Saturation | 1.2                                  | <p>Adjusts the result of the SaturationKernel by this factor.</p> <div>  <b>Note:</b> Saturation is the only control exposed by the default SaturationKernel. For more information on writing kernels and some examples, see <b>Help &gt; Documentation</b>. </div> |
| Publish               | publishButton               | N/A                                  | <p>Click to create a Group node containing a copy of the current node. The Group can then be saved as a gizmo.</p> <p>The kernel parameters and GPU controls are exposed as user controls in the published version of the node.</p>                                                                                                                  |
| Protect kernel        | protectKernelWhenPublishing | disabled                             | When enabled, the kernel in the published group is encoded and is not readable when the published node is written to a script.                                                                                                                                                                                                                       |
| format                | format                      | Dependent on <b>Project Settings</b> | Sets the output format when <b>Specify output format</b> is enabled, but otherwise defaults to the input format size.                                                                                                                                                                                                                                |
| Specify output format | specifiedFormat             | disabled                             | <p>When enabled, allows you to set the output format using the <b>format</b> control.</p> <p>Enabling this control also exposes the <b>format</b> dropdown in the published Group node.</p>                                                                                                                                                          |

# BurnIn

The BurnIn node allows you to add text to certain areas of your footage quickly, without relying on the Text node.

## Inputs and Controls

| Connection Type | Connection Name | Function                                   |
|-----------------|-----------------|--------------------------------------------|
| Input           | 1               | The image to which the burn-in is applied. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                    |
|--------------|------------------|---------------|-----------------------------------------------------------------------------|
| BurnIn Tab   |                  |               |                                                                             |
| color        | burnIn_color     | 1             | Sets the color of the burn-in text.                                         |
| opacity      | burnIn_opacity   | 1             | Sets the opacity of the burn-in text.                                       |
| x-padding    | burnIn_xpadding  | 30            | Controls the position of the burn-in fields on the x and y axes, in pixels. |
| y-padding    | burnIn_yPadding  | 30            |                                                                             |
| font         | font family      | Utopia        | Sets the burn-in font and style.                                            |
|              | font style       | Regular       |                                                                             |
| text scale   | burnIn_textScale | 0.5           | Sets the size of the burn-in text.                                          |

| Control (UI)   | Knob (Scripting)         | Default Value           | Function                                                                                                                                                          |
|----------------|--------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| top left       | burnIn_topLeft           | hiero/clip              | Determines the metadata used to create the burn-in text in the six positions listed.<br><br>Setting a dropdown to <b>none</b> removes burn-in from that position. |
| top middle     | burnIn_topMiddle         | hiero/sequence          |                                                                                                                                                                   |
| top right      | burnIn_topRight          | hiero/shot              |                                                                                                                                                                   |
| bottom left    | burnIn_bottomLeft        | hiero/track             |                                                                                                                                                                   |
| bottom middle  | burnIn_bottomMiddle      | hiero/project           |                                                                                                                                                                   |
| bottom right   | burnIn_bottomRight       | hiero/sequence/timecode |                                                                                                                                                                   |
| Background Tab |                          |                         |                                                                                                                                                                   |
| enable         | burnIn_backgroundEnable  | disabled                | When enabled, the burn-in text has a background determined by the <b>color</b> , <b>opacity</b> , and <b>border</b> controls.                                     |
| color          | burnIn_backgroundColor   | 0,0,0,1                 | Sets the color of the burn-in background.                                                                                                                         |
| opacity        | burnIn_backgroundOpacity | 1                       | Sets the opacity of the burn-in background.                                                                                                                       |
| x-border       | burnIn_backgroundXBorder | 10                      | Controls the width and height of the burn-in background, in pixels.                                                                                               |
| y-border       | burnIn_backgroundYBorder | 5                       |                                                                                                                                                                   |

# DiskCache

DiskCache caches to disk scanlines from its input as they are requested by its output. It does this at full 32-bit floating point. This allows Nuke to reference the cached data instead of constantly recalculating the output of the preceding nodes.

By default, DiskCache caches the selected channels of the current frame at the current zoom level.

DiskCache can be useful, for example, if:

- you are working on a large, complex node tree. Using the DiskCache node, you can break the node tree into smaller sections and cache any branches that you are no longer working on.
- you are reading in images from a network. If you insert a DiskCache node after a Read node, the image will be cached locally and displayed faster.
- you are painting or rotoscoping. If you insert a DiskCache node before a RotoPaint node, flipping frames becomes faster.

The cached images are saved in the same directory as the images the Nuke Viewer caches automatically. You can set the location and size of this directory in the Preferences. A large, fast local disk is DiskCache's best friend.

If you make a change in the nodes upstream, the affected cached images are discarded and automatically recalculated.

## Inputs and Controls

| Connection Type | Connection Name | Function                        |
|-----------------|-----------------|---------------------------------|
| Input           | unnamed         | The node tree to cache locally. |

| Control (UI)                                                                                                                                           | Knob (Scripting) | Default Value | Function                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------|
| DiskCache Tab                                                                                                                                          |                  |               |                                                                                                              |
| channels                                                                                                                                               | channels         | all           | Sets the channels to cache from the current frame at the current zoom level.                                 |
| Precache                                                                                                                                               | Precache         | n/a           | Click to force all lines in the frame to be calculated and cached.                                           |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                  |               |                                                                                                              |
| before render                                                                                                                                          | beforeRender     | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts. |

| Control (UI)      | Knob (Scripting)  | Default Value | Function                                                                                                                                             |
|-------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| before each frame | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                             |
| after each frame  | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts. |
| after render      | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                            |
| render progress   | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                               |

# Dot

You can use the Dot node to make bends in the connecting arrows between other nodes. This can help you keep your script easy to read.

The Dot node does not alter the input image in any way.

You can also create this node by pressing . (period) on the Node Graph.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence after which you want to add a bend in the connecting arrow. |

# Group

You can use the Group node to nest multiple nodes inside a single node. The original nodes are replaced with the Group node. When you create a Group node, its internal structure is shown in a separate Node Graph that opens.

You can also create this node by pressing **Ctrl/Cmd+G** on the Node Graph.

See also [Precomp](#), [VariableGroup](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                              |
|-----------------|-----------------|---------------------------------------------------------------------------------------|
| Input           | unnamed         | The image sequence to which you want to apply the nodes nested inside the Group node. |

| Control (UI)                                                                        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Group Tab (this includes the controls common to all nodes plus the following)       |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|  | N/A              | N/A           | Shows the internal structure of the Group node in a separate Node Graph. This can be useful if you want to see what the Group does or ungroup the nodes nested inside it.                                                                                                                                                                                                                                                                                                                   |
| export as gizmo...                                                                  | N/A              | N/A           | Exports the group of nodes as a gizmo that can be reused by other artists. Gizmos are saved in a separate .gizmo file in your Nuke plug-in folder. Nuke scripts can use gizmos just like any other node type. Saved scripts only contain the name and control settings for the gizmo; the definition is in the gizmo file and it is read at the same time the script is loaded into Nuke. Thus, you can alter the implementation of the gizmo and change all the scripts that are using it. |



| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                             |
|----------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------|
| lock all connections | lock_connections | disabled      | When enabled, the connections between the grouped nodes are locked so that they cannot be accidentally disconnected. |

# Input

Adds an input arrow to a [Group](#) node. This allows you to add multiple inputs to your Group or gizmo (for example a main input and a mask input). By default, the inputs are numbered, but if you want to name them, you can do so by renaming the Input nodes.

Note that you should always connect the main input first and any optional inputs after.

See also [Group](#) and [Output](#).

# Link

Link Nodes enable you to make a linked copy of a node, and have changes updated in both nodes, whilst optionally being able to override any of the knobs. See [Using Link Nodes](#).

In the node graph, go to **Edit > Link**. Link Nodes do not exist on their own and act as a connection between copied nodes only.

A yellow **L** on any nodes indicates a link node. A yellow box to the left of the node indicates an override.

## Inputs and Controls

| Connection Type | Connection Name | Function                   |
|-----------------|-----------------|----------------------------|
| Input           | unnamed         | The node you wish to link. |

# LiveGroup

LiveGroup nodes can be used in conjunction with LiveInput nodes so that multiple artists can work on different parts of the same shot as separate scripts, without the need for rendering. See [LiveInput](#) for more information.

LiveGroups are a hybrid of the functionality offered by Precomps, Groups, and Gizmos combining all the functionality that they lack individually. Just like Precomps, LiveGroups can store independent **.nk** files, allowing you to save a subset of the node tree as a separate **.nk** script, render the output of this saved script, and read the rendered output back into the source comp as a single image input.

You can also use LiveGroups like Group nodes to nest multiple nodes inside a single node. The original nodes are replaced with the LiveGroup node. When you create a LiveGroup node, its internal structure is shown in a separate Node Graph tab.

See also [Precomp](#) and [Group](#).

**Tip:** A **Variables** tab shows on the LiveGroup node. This allows you to work with Variables on shared scripts.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                     |
|-----------------|-----------------|----------------------------------------------------------------------------------------------|
| Input           | LiveInput1      | The image sequence to which you want to apply the nodes or script inside the LiveGroup node. |

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                     |
|---------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
| LiveGroup Tab |                  |               |                                                                                                                              |
| Publish       | publish          | N/A           | Click to change the LiveGroup to the 'Published' state and save the current LiveGroup as a <b>.nk</b> script to the location |

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |               | <p>specified in the <b>file</b> control.</p> <p>Publishing does not add the contents of the LiveGroup to the current script, instead nodes within the LiveGroup are read from the external script.</p>                                                                                                                                                                                                                                                                       |
| Make Editable        | make_editable    | N/A           | <p>Click to change the LiveGroup to the editable state.</p> <p><b>Make Editable</b> adds the contents of the LiveGroup to the current script when the script is saved.</p>                                                                                                                                                                                                                                                                                                   |
| file                 | file             | none          | Sets the location that the contents of the LiveGroup are read from or written to, depending on whether you're publishing or editing the group.                                                                                                                                                                                                                                                                                                                               |
| Reload               | reload_script    | n/a           | Click to recalculate the <b>.nk</b> script specified in the <b>file</b> control to create the output.                                                                                                                                                                                                                                                                                                                                                                        |
| Open                 | open             | n/a           | Click to open the <b>.nk</b> script specified in the <b>file</b> control in a new Nuke session.                                                                                                                                                                                                                                                                                                                                                                              |
| Render               | render           | n/a           | Click to render the <b>.nk</b> script specified in the <b>file</b> control and output the results from the LiveGroup node.                                                                                                                                                                                                                                                                                                                                                   |
| read file for output | reading          | disabled      | <p>When enabled, the LiveGroup node reads in the rendered image rather than calculating the output of the script.</p> <p>When disabled, Nuke calculates the output of the LiveGroup script.</p>                                                                                                                                                                                                                                                                              |
| missing frames       | on_error         | error         | <p>Sets the behavior when there is an error opening the output file:</p> <ul style="list-style-type: none"> <li>• <b>error</b> - display an error message on any missing frames.</li> <li>• <b>black</b> - replace any missing frames with black.</li> <li>• <b>checkerboard</b> - replace any missing frames with a checkerboard image.</li> <li>• <b>read input</b> - display the result of the input tree rather than the rendered file on any missing frames.</li> </ul> |
| Reload               | reload_write     | n/a           | Click to re-read the image written to disk.                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                 |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| advanced     |                  |               |                                                                                                                                                                                          |
| output node  | output           | none          | <p>Sets the name of the node to use instead of the Output node in the LiveGroup.</p> <p>You can use this control to override what is set as the Output node in the LiveGroup script.</p> |
| enable       | useOutput        | disabled      | When enabled, the node specified in the <b>output node</b> control is used instead of the Output node in the LiveGroup.                                                                  |

# LiveInput

The LiveInput node is a type of Input node. Adding a LiveInput to a container type node, such as a Group, Precomp, or LiveGroup adds a corresponding input connection to that container node, just like an Input node.

LiveInput differs from Input nodes in that they can reference Nuke scripts external to the current script, allowing you to work collaboratively with other artists in the context of a source script without the need for rendering or reading footage from the source script.

## Inputs and Controls

| Control (UI)  | Knob (Scripting) | Default Value | Function                                                                                                                                              |
|---------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| LiveInput Tab |                  |               |                                                                                                                                                       |
| liveGroup     | liveGroup        | N/A           | <p>Sets the LiveGroup from which the input is taken.</p> <p>Only LiveGroups from the script entered in the <b>file</b> control can be referenced.</p> |
| file          | file             | N/A           | Defines the location of Nuke script containing the referenced LiveGroup.                                                                              |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                   |
|--------------|------------------|---------------|--------------------------------------------------------------------------------------------|
| Reload       | reload_script    | N/A           | Click to re-read the referenced Nuke script and recalculate the contents of the LiveGroup. |
| Open         | open             | N/A           | Click to open the script defined in the <b>file</b> control in a new Nuke session.         |

# NoOp

NoOp passes the input image through unchanged. It does not alter the image in any way, but can be used as an interface for controlling other nodes. To do so, right-click on the NoOp control panel, select **Manage User Knobs**, and add the control you need (for example, a checkbox). Then, **Ctrl+Cmd**+drag this control on top of a control in another node (for example, the **disable** checkbox of a Blur node). This creates a linking Tcl expression that parents the Blur node's **disable** checkbox to the checkbox in the NoOp controls, allowing you to use the NoOp controls to disable the Blur node.

You could also use a NoOp node to change the **file** path of multiple Read nodes using a single control.

For more information on Tcl expressions, see Nuke's [online help](#) or select **Help > Documentation > Knob Math Expressions** in Nuke.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                   |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | <p>This image sequence is passed through unchanged.</p> <p>This input is optional - you don't need to connect NoOp to the node you want it to control.</p> |

# Output

Adds an output arrow to a [Group](#) node. This is necessary if the node tree that forms the Group has several branches and thus several possible output nodes. It can also be useful if you accidentally delete an Output node from a Group.

The output arrows are always unnamed.

See also [Group](#) and [Input](#).

# PostageStamp

You can add this node to your script to display a thumbnail render of the output at the current frame or a frame of your choice. This node does not alter the input image in anyway.

By default, the postage stamp is always updated to match the current frame. To change this behavior, press **Shift+S** to open the **Preferences** dialog, go to the **Node Graph** tab, and set **postage stamp mode** to **Static frame**. Then, set **static frame** in the PostageStamp node properties to the frame you want to display.



**Note:** If the frame number you use is outside the frame range for the node, it is clamped to the first or last frame in the range.

# Precomp

The Precomp node is like a [Group](#) node, but its content is stored in an independent **.nk** file. This allows you to save a subset of the node tree as a separate Nuke script, render the output of this saved script, and read the rendered output back into the main comp as a single image input. Precomp nodes can be useful in at least two ways:

- They can be used to reduce portions of the node tree to pre-rendered image inputs. This speeds up render time, as Nuke only has to process the single image input instead of all the nodes that were used to create it. Because the original nodes are saved in a separate **.nk** script, you also maintain access to them and can adjust them later if necessary.

- They enable a collaborative workflow. While one artist works on the main comp, others can work on the sections that have been exported using the Precomp node. These sections can be edited, versioned, and managed independent of the main comp.

You can also create this node by pressing **Ctrl/Cmd+Shift+P** on the Node Graph.

See also [Group](#).

## Inputs and Controls

| Control (UI)         | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                     |
|----------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Precomp Tab          |                  |               |                                                                                                                                                                                                                                                              |
| file                 | file             | N/A           | Sets the <b>.nk</b> script to use as the contents of the precomp.                                                                                                                                                                                            |
| Reload               | reload_script    | N/A           | Click to reload the <b>.nk</b> script specified in the <b>file</b> control.                                                                                                                                                                                  |
| Open                 | open             | N/A           | Click to open the <b>.nk</b> script specified in the <b>file</b> control in a new Nuke session.                                                                                                                                                              |
| Render               | render           | N/A           | Click to render the <b>.nk</b> script specified in the <b>file</b> control and output the results from the Precomp node.                                                                                                                                     |
| read file for output | reading          | disabled      | <p>When enabled, the Precomp node reads in the rendered precomp image rather than calculating the output of the precomp script.</p> <p>When disabled, Nuke calculates the output of the precomp script.</p>                                                  |
| missing frames       | on_error         | error         | <p>Sets the behavior when there is an error opening the output file:</p> <ul style="list-style-type: none"> <li>• <b>error</b> - display an error message on any missing frames.</li> <li>• <b>black</b> - replace any missing frames with black.</li> </ul> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <ul style="list-style-type: none"> <li>• <b>checkerboard</b> - replace any missing frames with a checkerboard image.</li> <li>• <b>read input</b> - display the result of the input tree rather than the rendered file on any missing frames.</li> </ul> |
| Reload       | reload_write     | N/A           | Click to re-read the image from disk.                                                                                                                                                                                                                    |
| advanced     |                  |               |                                                                                                                                                                                                                                                          |
| output node  | output           | N/A           | <p>Sets the name of the Write node to use instead of the Output node in the precomp.</p> <p>You can use this control to override what is set as the Output node in the precomp script.</p>                                                               |
| enable       | use_output       | disabled      | When enabled, the Write node specified in the <b>output node</b> control is used instead of the Output node in the precomp.                                                                                                                              |

# Root

The **Project Settings** in the Compositing environment are contained within the Root node, but the node itself is never visible in the Node Graph. When you start working on a script, you should first define the settings for it in the **Project Settings**.

You can display the **Project Settings** by navigating to **Edit > Project Settings** or by pressing **S** in the Node Graph.

## Controls

| Control (UI) | Knob (Scripting) | Default Value | Function |
|--------------|------------------|---------------|----------|
| Root Tab     |                  |               |          |



| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                        |
|----------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| name                 | name              | none          | Allows you to set the script name and path. This field is completed automatically the first time you save the script.                                           |
| project directory    | project_directory | none          | Sets the default location where project files are saved. For example, if you only specify a file name in a Write node, the files are rendered to this location. |
| Script Directory     | Script_directory  | N/A           | Click to set the <b>project directory</b> using an expression so that if the <b>.nk</b> file is relocated, the project directory updates automatically.         |
| comment              | label             | none          | Adds a comment to the script, which is only visible in the plain text of the <b>.nk</b> file in the <b>label</b> field.                                         |
| lock all connections | lock_connections  | disabled      | When enabled, all node connections are locked, making it easier to move nodes around the Node Graph without disconnecting them accidentally.                    |
| frame range          | first_frame       | 1             | Sets the frame range for the script, which is used for nodes that don't include their own frame range controls.                                                 |
|                      | last_frame        | 100           |                                                                                                                                                                 |
| lock range           | lock_range        | disabled      | When enabled, the frame range is locked so that adding new image sequences does not alter the frame range.<br><br>When disabled, adding new                     |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                   |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | image sequences alters the frame range to encompass the new range.                                                                                                                                                                                                                         |
| fps              | fps              | 24            | Sets the project frame rate. Adjusting this control affects the Viewer's frame rate as well.                                                                                                                                                                                               |
| full size format | format           | 2K_Super_35   | Sets the default format for the project.                                                                                                                                                                                                                                                   |
| proxy mode       | proxy            | disabled      | When enabled, images are rendered at either the proxy <b>scale</b> or <b>format</b> as specified by the proxy type control.                                                                                                                                                                |
|                  | proxy_type       | scale         | Sets the proxy type when proxy mode is enabled: <ul style="list-style-type: none"> <li>• <b>format</b> - the proxy resolution is determined by the <b>proxy format</b> control.</li> <li>• <b>scale</b> - the proxy resolution is determined by the <b>proxy scale</b> control.</li> </ul> |
| proxy scale      | proxy_scale      | 0.5           | Sets the proxy resolution when the proxy type control is set to <b>scale</b> .                                                                                                                                                                                                             |
| proxy format     | proxy_format     | 1K_Super_35   | Sets the proxy resolution when the proxy type control is set to <b>format</b> .                                                                                                                                                                                                            |
| read proxy files | proxySetting     | if larger     | Sets when Read nodes fallback to the proxy resolution when <b>proxy mode</b> is enabled: <ul style="list-style-type: none"> <li>• <b>never</b> - the proxy resolution files are never used.</li> <li>• <b>if larger</b> - the proxy resolution</li> </ul>                                  |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <p>files are used if the files are equal to or larger than the scaled size.</p> <ul style="list-style-type: none"> <li>• <b>if nearest</b> - the files closest to the scaled size is used.</li> <li>• <b>always</b> - the proxy resolution files are always used.</li> </ul>                                                                                                                                                                                                                                    |
| is live group    | is_live          | disabled      | When enabled, the script is saved as a LiveGroup script, allowing you to nest it within other scripts using the LiveGroup node.                                                                                                                                                                                                                                                                                                                                                                                 |
| render mode      | render_mode      | classic       | <p>Sets the Viewer render mode:</p> <ul style="list-style-type: none"> <li>• <b>classic</b> - enables the legacy scanline by scanline progressive rendering method.</li> <li>• <b>topdown</b> - enables the top-down rendering to render the full frame. Although <b>topdown</b> rendering produces the full frame faster, it disables progressive rendering and uses more memory. You may want to use the <b>classic</b> method if you're only interested in the first few scanlines in the Viewer.</li> </ul> |
| Color Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| color management | colorManagement  | Nuke          | <p>Sets which colorspace are available to Read/Write nodes and Viewer processLUTs in the current script.</p> <ul style="list-style-type: none"> <li>• <b>Nuke</b> - only the Nuke root</li> </ul>                                                                                                                                                                                                                                                                                                               |

| Control (UI)         | Knob (Scripting)     | Default Value | Function                                                                                                                                                                                                                                                                                                                      |
|----------------------|----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                      |               | <p>colorspaces are available.</p> <ul style="list-style-type: none"> <li>• <b>OCIO</b> - the specified OCIO config colorspaces are available as well as Nuke root colorspaces.</li> </ul>                                                                                                                                     |
| OCIO config          | OCIO_config          | nuke-default  | <p>When color management is set to <b>OCIO</b>, sets the configuration to use and populates the <b>default LUT settings</b> appropriately.</p> <p>Selecting <b>custom</b> allows you to reference a custom OCIO color file using the <b>custom OCIO config</b> control.</p>                                                   |
| custom OCIO config   | customOCIOConfigPath | none          | When OCIO config is set to custom, enter the file path and name of the <b>.config</b> file.                                                                                                                                                                                                                                   |
| default LUT settings |                      |               |                                                                                                                                                                                                                                                                                                                               |
| working space        | workingSpaceLUT      | linear        | <p>Sets the working colorspace within NukeHiero. Files are converted to this colorspace when they are read into NukeHiero. At render time, the files are converted from this colorspace to the selected output colorspace.</p> <p>If color management is set to <b>Nuke</b>, this control is always set to <b>linear</b>.</p> |
| monitor              | monitorLUT           | sRGB          | Sets the default LUT for postage stamps, OpenGL textures, and all non-Viewer image and color                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>displays.</p> <p>If your Viewer process is a simple LUT, set this control to the same LUT, although <b>sRGB</b> provides an acceptable result in most cases.</p> <div>  <p><b>Note:</b> When <b>color management</b> is set to <b>OCIO</b>, these colorspaces are grouped by the Display and saved in the <b>Project Settings</b>.</p> <p>Other colorspace types are grouped by the family name.</p> </div> |
| 8-bit files  | int8LUT          | sRGB          | Sets the default LUT used when reading and writing image data containing 8 bits.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 16-bit files | int16LUT         | sRGB          | Sets the default LUT used when reading and writing image data containing 16 bits.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| log files    | logLUT           | Cineon        | Sets the default LUT used when reading and writing image data containing Cineon/DPX style log data. These files are typically 10-bit.                                                                                                                                                                                                                                                                                                                                                             |
| float files  | floatLUT         | linear        | Sets the default LUT used when reading and writing image data containing floating point values.                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| luts         | luts             | none          | <p>Displays the lookup curves used to convert between file/device colorspace and the linear working colorspace used for internal operations.</p> <div>  <b>Note:</b> <b>SLog</b> has been deprecated in favor of <b>SLog1</b>, but remains in the list to ensure backward compatibility. </div> |
| +            | N/A              | N/A           | Click to add a new curve to the list of LUTs.                                                                                                                                                                                                                                                                                                                                      |
| reset        | N/A              | N/A           | Click to reset any points that you have adjusted on a curve to their default position.                                                                                                                                                                                                                                                                                             |
| -            | N/A              | N/A           | Click to delete a custom curve from the list of LUTs. You can't delete the default LUTs that ship with Nuke.                                                                                                                                                                                                                                                                       |
| Views Tab    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                    |
| +            | views            | N/A           | Click to add a new view to the script.                                                                                                                                                                                                                                                                                                                                             |
| -            | views            | N/A           | <p>Click to remove a view from the script.</p> <div>  <b>Note:</b> You cannot remove a view if it is the only view in the script. </div>                                                                                                                                                      |

| Control (UI)                                                                                                                                           | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| up                                                                                                                                                     | views            | N/A           | Click to move a view up or down the <b>views</b> list. The view at the top is the first listed above the Viewer.                                                                                                                                                                              |
| down                                                                                                                                                   | views            | N/A           |                                                                                                                                                                                                                                                                                               |
| views                                                                                                                                                  | views            | main          | Lists all the views currently in the script and the color associated with each view.<br><br><div>  <b>Note:</b> The colors are only visible in the script when <b>Use colors in UI?</b> is enabled. </div> |
| hero                                                                                                                                                   | hero_view        | main          | Sets the view that is loaded by default when the script is loaded.                                                                                                                                                                                                                            |
| Set up views for stereo                                                                                                                                | setlr            | N/A           | Click to automatically create left and right views for stereographic projects.                                                                                                                                                                                                                |
| View selection uses buttons?                                                                                                                           | views_button     | enabled       | When enabled, the views in the script are displayed as buttons above the Viewer.<br><br>When disabled, the views in the script are hidden in a dropdown menu.                                                                                                                                 |
| Use colors in UI?                                                                                                                                      | views_colours    | disabled      | When enabled, the colors specified per view in the <b>views</b> list are displayed above the Viewer and in Node Graph for clarity.                                                                                                                                                            |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                  |               |                                                                                                                                                                                                                                                                                               |

| Control (UI)          | Knob (Scripting)           | Default Value | Function                                                                                                                                                                  |
|-----------------------|----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| onScriptLoad          | onScriptLoad               | none          | These functions run when a script is loaded.                                                                                                                              |
| onScriptSave          | onScriptSave               | none          | These functions run when a script is saved.                                                                                                                               |
| onScriptClose         | onScriptClose              | none          | These functions run when a script is closed.                                                                                                                              |
| Live Group Callbacks  |                            |               |                                                                                                                                                                           |
| onLiveGroupMakeLocal  | onLiveGroupMakeLocal       | none          | These functions run after a LiveGroup node goes from the Published state to the Local state.                                                                              |
| onLiveGroupPrePublish | onLiveGroupPrePublish      | none          | These functions run before a LiveGroup is published. If this callback throws an error, the publish operation is interrupted.                                              |
| onLiveGroupPublish    | onLiveGroupPublish         | none          | These functions run after a LiveGroup is published.                                                                                                                       |
| onLiveGroupReload     | onLiveGroupReload          | none          | These functions run after a LiveGroup is reloaded.                                                                                                                        |
| Font Tab              |                            |               |                                                                                                                                                                           |
| project font path     | free_type_font_path        | none          | Allows you to specify a directory from which to read font files.                                                                                                          |
| include system fonts  | free_type_system_fonts     | enabled       | <p>When enabled, all the system fonts are available in addition to those that ship with Nuke.</p> <p>When disabled, only the fonts that ship with Nuke are available.</p> |
| Rescan font path      | RescanFreeTypeMappingPaths | N/A           | Click to rescan the specified <b>project font path</b> for new font files.                                                                                                |



# StickyNote

Lets you add notes to the Node Graph. The notes can be any text or HTML mark-up. Usually, they are made as annotations to the elements in the node tree.

See also [Backdrop](#).

# VariableGroup

The VariableGroup nodes allow you to define groups of Variables or scopes.

Inside the VariableGroup node, the Variables tab contains a single GsvKnob, which allows the user to create, edit and remove Variables and Variable Sets.

See more at [Using the VariableGroup Node](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | unnamed         | The place in the node graph to create a group of Variables. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                           |
|--------------|------------------|---------------|------------------------------------------------------------------------------------|
| Variables    | GsvKnob          | N/A           | In the Variables tab, you can create, edit and remove Variables and Variable Sets. |

# All plugins

This menu contains all nodes available in Nuke, including any unsupported nodes (such as earlier versions of the currently supported nodes). Note that some of these nodes may be unstable or cause unexpected behavior.

If you have any gizmos installed, they also appear in this menu.

To refresh the contents of the menu, click **Update**.

# FurnaceCore Nodes

FurnaceCore nodes contain the most popular Furnace plug-ins incorporated in NukeX and Nuke Studio.



**Note:** The following FurnaceCore nodes have been replaced by other nodes and can no longer be found in the **FurnaceCore** menu:

F\_DeGrain and F\_Denoise were replaced by Denoise (**Filter** > **Denoise**) in Nuke 6.3.

F\_Kronos was replaced by Kronos (**Time** > **Kronos**) in Nuke 7.0.

F\_MotionBlur was replaced by MotionBlur (**Filter** > **MotionBlur**) in Nuke 7.0.

F\_VectorGenerator was replaced by VectorGenerator (**Time** > **VectorGenerator**) in Nuke 7.0.

## F\_Align

F\_Align takes two sequences that were shot of the same scene and lines them up spatially. It uses Global Motion Estimation (GME) to calculate a four-corner pin so that each frame in one shot (the source input) will be aligned with the corresponding frame in a second shot (the reference input). The result is the source image which has been repositioned to line up with the reference image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                            |
|-----------------|-----------------|-----------------------------------------------------|
| Input           | Ref             | The reference image used to align the source image. |
|                 | Src             | The source image to align.                          |

| Control (UI)           | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F_Align Tab            |                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Analyse                | analyse          | N/A               | Click to begin analysis of the input clips and calculate a corner pin. Interrupting the analysis will not delete the corner pin keys that have already been calculated.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Render During Analysis | renderOn         | enabled           | <p>When enabled, this toggle causes the effect to update the time line and render a freshly analyzed frame in the Viewer so you can see the progress of the effect.</p> <div>  <b>Note:</b> Disabling this control may speed up the general analysis. </div>                                                                                                                                                                                                                                                   |
| Clear Analysis         | clear            | N/A               | Click to delete all key frames from the corner pin controls, allowing you to force a re-analysis if you feel the need to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Analysis Range         | range            | Source Clip Range | <p>This controls the range of frames any analysis runs over:</p> <ul style="list-style-type: none"> <li>• <b>Specified Range</b> - reads the <b>Analysis Start</b> and <b>Analysis Stop</b> fields for the range of frames to analyze.</li> <li>• <b>Source Clip Range</b> - automatically determines the range of frames to analyze from the length of the clip attached to the <b>Src</b> input.</li> <li>• <b>Current Frame</b> - the analysis occurs only on the current frame. This is useful for correcting any errors that may have occurred while analyzing the entire clip.</li> </ul> |
| Analysis Start         | start            | 0                 | The first frame analyzed if <b>AnalysisRange</b> is set to <b>SpecifiedRange</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Analysis Stop          | stop             | 100               | The last frame analyzed if <b>AnalysisRange</b> is set to <b>SpecifiedRange</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Scale                  | scale            | disabled          | Indicates whether the calculated corner pin can include a scaling factor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Rotate                 | rotate           | enabled           | Indicates whether the calculated corner pin can include rotations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Translate              | translate        | enabled           | Indicates whether the calculated corner pin can include                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                  |               | translations on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Perspective                | perspective      | disabled      | Indicates whether the calculated corner pin can include perspective transforms.                                                                                                                                                                                                                                                                                                                                                                                   |
| Analysis Region            |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Analysis Region BL         | regionBL         | N/A           | The region analyzed to calculate the four-corner pin. This is especially useful when doing any form of frame locking, in which case, go to the lock frame, look at the reference clip and position the box over the area you want locked.<br><br>• <b>Analysis Region BL</b> - controls the position of the bottom left corner of the analysis region.<br><br>• <b>Analysis Region TR</b> - controls the position of the top right corner of the analysis region. |
| Analysis Region TR         | regionTR         | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Advanced                   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Accuracy                   | accuracy         | 0.9           | Controls the time/accuracy trade off. Higher values slow the analysis, but can produce better result.                                                                                                                                                                                                                                                                                                                                                             |
| Filtering                  | filtering        | Medium        | Sets the filtering quality:<br><br>• <b>Low</b> - low quality but quick to render.<br><br>• <b>Medium</b> - uses a bilinear filter. This gives good results and is quicker to render than <b>High</b> quality filtering.<br><br>• <b>High</b> - uses a sinc filter to interpolate pixels giving a sharper repair. This gives the best results but takes longer to process.                                                                                        |
| Invert                     | invert           | disabled      | Enable this control to use the inverse of the calculated four-corner pin during render.                                                                                                                                                                                                                                                                                                                                                                           |
| Advanced > Four Corner Pin |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bottom Left                | pinBL            | N/A           | The bottom left corner pin calculated during the analysis pass.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bottom Right               | pinBR            | N/A           | The bottom right corner pin calculated during the analysis pass.                                                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------|
| Top Left     | pinTL            | N/A           | The top left corner pin calculated during the analysis pass.  |
| Top Right    | pinTR            | N/A           | The top right corner pin calculated during the analysis pass. |
| About        | about            | N/A           | Displays a dialog containing information about this node.     |

# F\_DeFlicker2

F\_DeFlicker2 is used to remove flicker - particularly flicker that is localized and dependent on the geometry of the scene (that is, flicker that is not present across the whole of the image), such as that caused by an unsynchronized fluorescent light in a shot.



**Note:** F\_DeFlicker2 looks at input frames outside the current frame when performing calculations, and therefore can be a computationally expensive node. As such, using more than two instances of F\_DeFlicker2 in a node tree will dramatically increase render times. It is strongly advised therefore, that you render each instance out separately.

## Inputs and Controls

| Connection Type | Connection Name | Function                          |
|-----------------|-----------------|-----------------------------------|
| Input           | Src             | The sequence requiring deflicker. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                              |
|------------------|------------------|---------------|---------------------------------------------------------------------------------------|
| F_DeFlicker2 Tab |                  |               |                                                                                       |
| DeFlicker Amount | amount           | 0.3           | Reduces flicker without removing it entirely; lower values leave more flicker behind. |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Block Size     | blockSize        | 9.6           | <p>Defines the width and height of the control block (in pixels) centered around a particular pixel analysed by the deflicker algorithm.</p> <div>  <b>Note:</b> The default value avoids the loss of detail and noisy motion fields associated with higher and lower <b>BlockSize</b>, and rarely needs adjusting. </div> |
| Use Motion     | useMotion        | enabled       | Enables a second deflicker pass using motion-compensated frames. This can improve results in areas where there is fast motion, where the initial deflicker pass may have introduced blurring.                                                                                                                                                                                                               |
| Vector Detail  | vectorDetail     | 0.2           | Set the density of the motion vectors used when <b>UseMotion</b> is turned on. The maximum value of 1 generates one vector per pixel, producing the most accurate vectors, but taking longer to render. The default value of 0.2 generates a vector at every fifth pixel.                                                                                                                                   |
| Analysis Range | range            | 2             | The number of frames searched each side of the current frame when calculating the flicker. Higher values may give better results, but can also bring in erroneous information and take longer to process.                                                                                                                                                                                                   |
| About          | about            | N/A           | Displays a dialog containing information about this node.                                                                                                                                                                                                                                                                                                                                                   |

# F\_ReGrain

F\_ReGrain is used to add grain to a sequence. It is designed to sample an area of grain from one image and then to generate unlimited amounts of this grain with exactly the same statistics as the original. This new grain can then be applied to another image.

See also [Grain](#) and [ScannedGrain](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                       |
|-----------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Grain           | The image from which grain is sampled. When a <b>Grain</b> input is supplied, F_ReGrain automatically switches to using grain sampled from this input. However, the supplied grain stocks are still available. |
|                 | Src             | The image to which the grain is added.                                                                                                                                                                         |

| Control (UI)  | Knob (Scripting) | Default Value    | Function                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F_ReGrain Tab |                  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Grain Type    | grainType        | Preset Stock     | <p>Selects whether the grain is sampled from the <b>Grain</b> input or from a set of standard stocks.</p> <ul style="list-style-type: none"> <li>• <b>Preset Stock</b> - grain characteristics are sampled from the film stock specified in the <b>Preset Stock</b> field.</li> <li>• <b>From Grain Clip</b> - samples and reconstructs the grain characteristics from the Grain input.</li> </ul>                                |
| Preset Stock  | presetStock      | FUJIF250under 2K | The film stock that grain characteristics are sampled from when <b>GrainType</b> is set to <b>PresetStock</b> .                                                                                                                                                                                                                                                                                                                   |
| Grain Amount  | amount           | 1                | Adjusts the brightness of the grain. Setting this to 0 adds no grain.                                                                                                                                                                                                                                                                                                                                                             |
| Grain Size    | size             | 1                | Adjusts the size of the grain granules. The larger the value, the bigger and softer the granules.                                                                                                                                                                                                                                                                                                                                 |
| Output        | output           | Result           | <p>Sets whether to render the result or a test image.</p> <ul style="list-style-type: none"> <li>• <b>Result</b> - shows the <b>Src</b> input with the grain applied.</li> <li>• <b>Grain Plate</b> - shows a test image with the grain applied. This test image is composed from a section of the input image surrounded by a uniform solid color sampled from the image with the grain applied. If the inner area is</li> </ul> |



| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |               | indistinguishable from the outer area, then you have a good grain sample.                                                                                                                                                                                                                                                                                            |
| Analyse            | analyse          | N/A           | <p>Click to begin analysis of the source. Press this button if the input clip from which the grain was analyzed has changed, but you do not want to move the analysis region to trigger re-analysis.</p> <div>  <b>Note:</b> A warning displays when the input clip changes. </div> |
| Analysis Region    |                  |               |                                                                                                                                                                                                                                                                                                                                                                      |
| Analysis Region BL | regionBL         | N/A           | <p>A selection box that marks the region of image used to analyze the grain when <b>GrainType</b> is set to <b>From Grain Clip</b>. This part of the frame must contain no image detail, only grain.</p>                                                                                                                                                             |
| Analysis Region TR | regionTR         | N/A           | <ul style="list-style-type: none"> <li>• <b>Analysis Region BL</b> - controls the position of the bottom left corner of the analysis region.</li> <li>• <b>Analysis Region TR</b> - controls the position of the top right corner of the analysis region.</li> </ul>                                                                                                 |
| Analysis Frame     | frame            | 1             | Sets the frame to sample the grain from.                                                                                                                                                                                                                                                                                                                             |
| Grain Colour Space | grainColourSpace | sRGB          | <p>This tells F_ReGrain what color space the grain sample clip was in when the grain originated. Setting this correctly ensures that the grain is not exaggerated by any color space conversions prior to sampling.</p> <ul style="list-style-type: none"> <li>• Cineon</li> <li>• sRGB</li> <li>• Linear</li> </ul>                                                 |

| Control (UI)              | Knob (Scripting) | Default Value      | Function                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------|------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced                  |                  |                    |                                                                                                                                                                                                                                                                                                                                                                         |
| Process Red               | processRed       | enabled            | Disable this if you do not want to process the red channel.                                                                                                                                                                                                                                                                                                             |
| Red Amount                | redAmount        | 1                  | Sets the brightness of the grain in the red channel.                                                                                                                                                                                                                                                                                                                    |
| Red Size                  | redSize          | 1                  | Adjusts the size of the grain granules in the red channel.                                                                                                                                                                                                                                                                                                              |
| Process Green             | processGreen     | enabled            | Disable this if you do not want to process the green channel.                                                                                                                                                                                                                                                                                                           |
| Green Amount              | greenAmount      | 1                  | Sets the brightness of the grain in the green channel.                                                                                                                                                                                                                                                                                                                  |
| Green Size                | greenSize        | 1                  | Adjusts the size of the grain granules in the green channel.                                                                                                                                                                                                                                                                                                            |
| Process Blue              | processBlue      | enabled            | Disable this if you do not want to process the blue channel.                                                                                                                                                                                                                                                                                                            |
| Blue Amount               | blueAmount       | 1                  | Sets the brightness of the grain in the blue channel.                                                                                                                                                                                                                                                                                                                   |
| Blue Size                 | blueSize         | 1                  | Adjusts the size of the grain granules in the blue channel.                                                                                                                                                                                                                                                                                                             |
| Advanced > Grain Response |                  |                    |                                                                                                                                                                                                                                                                                                                                                                         |
| Apply Grain In            | srcColourSpace   | Grain Colour Space | <p>Sets what color space the grain sample is re-applied to the image:</p> <ul style="list-style-type: none"> <li>• <b>Cineon / sRGB / Linear</b> - the grain sample is applied in the specified space.</li> <li>• <b>Grain Colour Space</b> - the grain sample is applied in the color space set in the <b>Analysis Range &gt; Grain Colour Space</b> field.</li> </ul> |
| Low Gain                  | lowGain          | 1                  | Adjusts the gain of the grain in the lowlights.                                                                                                                                                                                                                                                                                                                         |
| Mid Gain                  | midGain          | 1                  | Adjusts the gain of the grain in the midtones.                                                                                                                                                                                                                                                                                                                          |
| High Gain                 | highGain         | 1                  | Adjusts the gain of the grain in the highlights.                                                                                                                                                                                                                                                                                                                        |
| Use Sampled               | useResponse      | disabled           | Enable this control to scale the brightness of the                                                                                                                                                                                                                                                                                                                      |

| Control (UI)          | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Response              |                  |               | grain as a function of the luminance of the <b>Grain</b> image.                                                                                                                                                                                                                                                                           |
| Sampled Response Mix  | responseMix      | 1             | <p>Decreasing the <b>Sampled Response Mix</b> control reduces the effect of the response curves until, at 0, they have no effect on the output.</p> <div>  <b>Note:</b> This control is only available if <b>Use Sampled Response</b> is enabled. </div> |
| Sample Grain Response | sample           | N/A           | <p>Click to update the response curves from the current frame. Multiple clicks accumulate the grain response rather than resetting every time.</p> <div>  <b>Note:</b> This control is only available if <b>Use Sampled Response</b> is enabled. </div>  |
| Reset Grain Response  | reset            | N/A           | <p>Click to reset the grain curves to their default (flat) response.</p> <div>  <b>Note:</b> This control is only available if <b>Use Sampled Response</b> is enabled. </div>                                                                          |
| Draw Response         | drawResponse     | disabled      | <p>Overlay the response curves on the bottom left corner of the viewer.</p> <div>  <b>Note:</b> This control is only available if <b>Use Sampled Response</b> is enabled. </div>                                                                       |
| About                 | about            | N/A           | Displays a dialog containing information about this node.                                                                                                                                                                                                                                                                                 |

# F\_RigRemoval

F\_RigRemoval eliminates unwanted objects, or rigs, from image sequences without the need for accurate rotoscoping or keying to produce a clean plate. The rig removal algorithm works by estimating the background motion between successive frames, ignoring the foreground object, and then using the motion information to look forward and backward in the sequence in order to find the correct piece of background to fill in the missing region.

See also [RotoPaint](#) and [Project3D](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| Input           | RigMask         | An optional mask to designate the rig area to remove.                                                                   |
|                 | Src             | The source image containing the unwanted object or rig. The source may contain an alpha channel to define the rig area. |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F_RigRemoval Tab |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Rig Region       | rigRegion        | Box           | <p>Defines the area to repair:</p> <ul style="list-style-type: none"> <li>• <b>Box</b> - repair the area inside a rectangular box, controlled by the <b>Rig Region Box</b> controls or the on-screen box.</li> <li>• <b>Src Alpha</b> - repair the region defined by the alpha of the <b>Src</b> input.</li> <li>• <b>Src Inverted Alpha</b> - repair the region defined by the inverted alpha of the <b>Src</b> input.</li> <li>• <b>RigMask Luminance</b> - repair the region defined by the luminance of the <b>Rig Mask</b> input.</li> <li>• <b>RigMask Inverted Luminance</b> - repair the region</li> </ul> |

| Control (UI)         | Knob (Scripting) | Default Value        | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                  |                      | <p>defined by the inverted luminance of the <b>Rig Mask</b> input.</p> <ul style="list-style-type: none"> <li>• <b>RigMask Alpha</b> - repair the region defined by the alpha of the <b>Rig Mask</b> input.</li> <li>• <b>RigMask Inverted Alpha</b> - repair the region defined by the inverted alpha of the <b>Rig Mask</b> input.</li> </ul>                                                                                                                                                                                                                                                                                                                                |
| Frames Searched      | framesSearched   | Forward and Backward | <p>Select whether to search forwards, backwards, or in both directions to find missing data.</p> <ul style="list-style-type: none"> <li>• <b>Forward and Backward</b> - searches before and after the current frame.</li> <li>• <b>Forward</b> - searches frames after the current frame.</li> <li>• <b>Backward</b> - searches frames before the current frame.</li> </ul>                                                                                                                                                                                                                                                                                                    |
| Frame Range          | frameRange       | 4                    | <p>Sets the number of frames the algorithm looks forwards and backwards in the sequence to find the missing data. If you are getting red pixels, then increase this value.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Frames Used in Range | framesUsed       | Half of Frames       | <p>If the <b>Frame Range</b> is set to a large number, the rendering time can be prohibitive. <b>Frames Used in Range</b> may speed up the repair by not using every frame to fill the foreground region, effectively skipping frames. However, this may reduce the quality of the result.</p> <ul style="list-style-type: none"> <li>• <b>All Frames</b> - use every frame in the specified frame range to construct the repair.</li> <li>• <b>Half of Frames</b> - use every other frame in the specified frame range to construct the repair.</li> <li>• <b>Quarter of Frames</b> - use every fourth frame in the specified frame range to construct the repair.</li> </ul> |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                  |               | <ul style="list-style-type: none"><li>• <b>10% of Frames</b> - use every tenth frame in the specified frame range to construct the repair.</li><li>• <b>Max 25 Frames</b> - use no more than 25 frames from the specified frame range to construct the repair. This option can be useful if <b>Frame Range</b> has been set to a very large number.</li></ul>                                          |
| Max Rig Movement | maxRigMove       | 30            | To avoid perspective changes, F_RigRemoval searches for the missing data inside an area immediately around the <b>RigRegion</b> . <b>Max Rig Movement</b> defines the width of this area (in pixels). Fast movement in the <b>Src</b> input may require a higher value than slow movement.                                                                                                             |
| Rig Region Box   |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                        |
| Rig Region BL    | regionBL         | N/A           | The rectangular area used to define the repair when <b>Rig Region</b> is set to <b>Box</b> . <ul style="list-style-type: none"><li>• <b>Rig Region BL</b> - controls the position of the bottom left corner of the rig region.</li><li>• <b>Rig Region TR</b> - controls the position of the top right corner of the rig region.</li></ul>                                                             |
| Rig Region TL    | regionTR         | N/A           |                                                                                                                                                                                                                                                                                                                                                                                                        |
| Advanced         |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                        |
| Filtering        | filtering        | Medium        | Sets the filtering quality. <ul style="list-style-type: none"><li>• <b>Low</b> - low quality but quick to render.</li><li>• <b>Medium</b> - uses a bilinear filter. This gives good results and is quicker to render than high filtering.</li><li>• <b>High</b> - uses a sinc filter to interpolate pixels giving a sharper repair. This gives the best results but takes longer to process.</li></ul> |
| Luminance        | lumCorrect       | disabled      | Enable this to correct for luminance changes from                                                                                                                                                                                                                                                                                                                                                      |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                     |
|----------------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Correct                    |                  |               | information taken from other frames. This is particularly important if the lighting changes throughout the sequence.                                                                                                                                                         |
| Perspective Correct        | perspCorrect     | disabled      | Enable this to correct for minor perspective changes.                                                                                                                                                                                                                        |
| Overlap Correct            | overlapCorrect   | 1             | The repair is built up using slices of information from other frames in the sequence which are then overlapped and blended to give a more natural looking repair. This value controls how much the regions overlap. Increasing this value too much degrades image sharpness. |
| Repair Fail Marker Opacity | failOpacity      | 0.5           | Sets the level of transparency of the red pixels used to show where the repair has failed.                                                                                                                                                                                   |
| Preserve Alpha             | preserveAlpha    | disabled      | Enable this to preserve the original alpha channel. By default, the alpha channel is set to white where the repair has failed and black everywhere else.                                                                                                                     |
| About                      | about            | N/A           | Displays a dialog containing information about this node.                                                                                                                                                                                                                    |

# F\_Steadiness

F\_Steadiness uses Global Motion Estimation (GME) to calculate a four-corner pin, so that camera motion within a single shot can be smoothed out over a range of frames or removed by locking to a specific frame.

## Inputs and Controls

| Connection Type | Connection Name | Function                      |
|-----------------|-----------------|-------------------------------|
| Input           | Src             | The source clip to stabilize. |

| Control (UI)           | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------|------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F_Steadiness Tab       |                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Analyse                | analyse          | N/A               | Click to begin an analysis of the input clip and calculate a corner pin. Interrupting the analysis will not delete the corner pin keys that have already been calculated.                                                                                                                                                                                                                                                                                                                                                   |
| Render During Analysis | renderOn         | enabled           | <p>When enabled, this toggle causes the effect to update the time line and render a freshly analyzed frame in the Viewer so you can see the progress of the effect.</p> <div>  <b>Note:</b> Disabling this control may speed up the general analysis. </div>                                                                                                                                                                               |
| Clear Analysis         | clear            | N/A               | Click to delete all key frames from the corner pin controls, allowing you to force a re-analysis if you feel the need to.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Analysis Range         | range            | Source Clip Range | <p>This controls the range of frames any analysis runs over:</p> <ul style="list-style-type: none"> <li>• <b>Specified Range</b> - reads the <b>Analysis Start</b> and <b>Analysis Stop</b> fields for the range of frames to analyze.</li> <li>• <b>Source Clip Range</b> - automatically determines the range of frames to analyze from the length of the clip attached to the <b>Src</b> input.</li> </ul>                                                                                                               |
| Analysis Start         | start            | 0                 | The first frame analyzed if <b>AnalysisRange</b> is set to <b>SpecifiedRange</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Analysis Stop          | stop             | 100               | The last frame analyzed if <b>AnalysisRange</b> is set to <b>SpecifiedRange</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Mode                   | mode             | Smooth            | <p>This controls whether F_Steadiness is smoothing the shot while keeping the overall camera motion, or locking the shot to a single frame to completely remove camera motion. It can be set to:</p> <ul style="list-style-type: none"> <li>• <b>Incremental Lock</b> - calculates the pin that takes each frame to the lock frame. This calculates the pin by working from the lock frame out to each frame, calculating the GME between each frame incrementally and accumulating it to create the corner pin.</li> </ul> |



| Control (UI)       | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                  |               | <ul style="list-style-type: none"> <li>• <b>Absolute Lock</b> - this also calculates a pin that takes each frame to the lock frame. However, it does so by doing GME directly from the frame in question directly to the lock frame.</li> <li>• <b>Smooth</b> - in which case, the shot is smoothed for a range of frames described by the <b>Smoothing</b> control. Use <b>Smooth</b> to keep the overall camera motion, but to smooth out sharp bumps and kicks.</li> </ul> |
| Scale              | scale            | disabled      | Indicates whether the calculated corner pin can include a scaling factor.                                                                                                                                                                                                                                                                                                                                                                                                     |
| Rotate             | rotate           | enabled       | Indicates whether the calculated corner pin can include rotations.                                                                                                                                                                                                                                                                                                                                                                                                            |
| Translate          | translate        | enabled       | Indicates whether the calculated corner pin can include translations on the x and y axes.                                                                                                                                                                                                                                                                                                                                                                                     |
| Perspective        | perspective      | disabled      | Indicates whether the calculated corner pin can include perspective transforms.                                                                                                                                                                                                                                                                                                                                                                                               |
| Analysis Region    |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Analysis Region BL | regionBL         | N/A           | This is the region analyzed to calculate the four-corner pin. This is especially useful when doing any form of frame locking, in which case, go to the lock frame, look at the reference clip and position the box over the area you want locked.                                                                                                                                                                                                                             |
| Analysis Region TR | regionTR         | N/A           | <ul style="list-style-type: none"> <li>• <b>Analysis Region BL</b> - controls the position of the bottom left corner of the analysis region.</li> <li>• <b>Analysis Region TR</b> - controls the position of the top right corner of the analysis region.</li> </ul>                                                                                                                                                                                                          |
| Advanced           |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Smoothing          | smooth           | 10            | Controls the range of frames to average motion over when <b>Mode</b> is set to <b>Smooth</b> .                                                                                                                                                                                                                                                                                                                                                                                |
| Lock Frame         | lockFrame        | 0             | Controls the frame locked to when <b>Mode</b> is set to either                                                                                                                                                                                                                                                                                                                                                                                                                |

| Control (UI)               | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                  |               | <p>of the lock modes.</p> <div>  <b>Note:</b> Frame 0 for F_Steadiness is frame 1 in NukeX. Therefore, if you are looking at frame 3 in the Viewer and want to use that frame as the lock frame, you need to enter 2 as the <b>LockFrame</b> value. </div>                                                                              |
| Accuracy                   | accuracy         | 0.6           | Controls the time/accuracy trade off. The higher this is, the slower the analysis, but you have a better likelihood of a good result.v                                                                                                                                                                                                                                                                                   |
| Filtering                  | filtering        | Medium        | <p>Sets the filtering quality.</p> <ul style="list-style-type: none"> <li>• <b>Low</b> - low quality but quick to render.</li> <li>• <b>Medium</b> - uses a bilinear filter. This gives good results and is quicker to render than <b>High</b> filtering.</li> <li>• <b>High</b> - uses a sinc filter to interpolate pixels giving a sharper repair. This gives the best results but takes longer to process.</li> </ul> |
| Invert                     | invert           | disabled      | When enabled, the inverse of the calculated four-corner pin is used during render. This works best with the lock modes, and can be used to track static locked-off plates back into a shot.                                                                                                                                                                                                                              |
| Auto Scale                 | autoScale        | 1             | Automatically fills in the black gaps at the edges of the <b>Src</b> by scaling the output image up. A value of 1 scales the image up until no black is visible, whereas a value of 0 disables scaling and leaves the black edges untouched.                                                                                                                                                                             |
| Advanced > Four Corner Pin |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Bottom Left                | pinBL            | N/A           | The bottom left corner pin calculated during the analysis pass.                                                                                                                                                                                                                                                                                                                                                          |
| Bottom Right               | pinBR            | N/A           | The bottom right corner pin calculated during the analysis pass.                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                      |
|--------------|------------------|---------------|---------------------------------------------------------------|
| Top Left     | pinTL            | N/A           | The top left corner pin calculated during the analysis pass.  |
| Top Right    | pinTR            |               | The top right corner pin calculated during the analysis pass. |
| About        | about            | N/A           | Displays a dialog containing information about this node.     |

# F\_WireRemoval

F\_WireRemoval is particularly good at removing wires over heavily motion blurred backgrounds or wires over smoke, dust, or clouds. It can be used to remove each wire in a sequence or to quickly create a clean plate which can then be tracked into place.

F\_WireRemoval also incorporates a tracker which automatically tracks a moving wire through a clip. This tracker has its own control panel, which will float inside the Viewer if you have checked **Show On Screen Controls** in the F\_WireRemoval controls.

See also [RotoPaint](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                 |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | CleanPlate      | An optional input to allow you to supply a clean plate. This is used by the <b>CleanPlate</b> repair mode which will warp the clean plate onto the current frame and use the warped image to reconstruct the background behind the wire. |
|                 | Source          | The clip containing the wire to be removed.                                                                                                                                                                                              |

| Control (UI)                                                                        | Knob (Scripting)      | Default Value | Function                                                                                                                                                               |
|-------------------------------------------------------------------------------------|-----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F_WireRemoval Tab                                                                   |                       |               |                                                                                                                                                                        |
|    | setUserKeyFrame       | N/A           | Create user key frame - creates a user key frame.                                                                                                                      |
|    | deleteUserKeyFrame    | N/A           | Delete user key frame - deletes a user key frame.                                                                                                                      |
|    | snapToWire            | N/A           | Snap to wire - finds the edges of the wire and snaps the edges of the region onto them.                                                                                |
|    | trackBwd              | N/A           | Track backwards - plays backwards through the sequence tracking from frame to frame.                                                                                   |
|   | stepBwd               | N/A           | Step backward - tracks backwards one frame.                                                                                                                            |
|  | stepFwd               | N/A           | Step forward - tracks forward one frame.                                                                                                                               |
|  | trackFwd              | N/A           | Track forwards - plays forwards through the sequence tracking from frame to frame.                                                                                     |
|  | smartTrack            | N/A           | Smart track - tracks from beginning to end of frame range in an intelligent order.                                                                                     |
|  | deleteTrackKeysBwd    | N/A           | Delete track key frames backwards - deletes track key frames backwards through the sequence until either a user key frame or the beginning of the sequence is reached. |
|  | deleteTrackKeyStepBwd | N/A           | Delete track key frame and step backward - deletes a track key frame and steps backwards one frame.                                                                    |

| Control (UI)                                                                       | Knob (Scripting)      | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------|-----------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | deleteTrackKey        | N/A           | Delete track key frame - delete the current track key frame.                                                                                                                                                                                                                                                                                                                                                     |
|   | deleteTrackKeyStepFwd | N/A           | Delete track key frame and step forwards - deletes a track key frame and steps forwards one frame.                                                                                                                                                                                                                                                                                                               |
|   | deleteTrackKeysFwd    | N/A           | Delete track key frames forwards - deletes track key frames forwards through the sequence until either a user key frame or the end of the sequence is reached.                                                                                                                                                                                                                                                   |
|   | deleteAllTrackKeys    | N/A           | Delete all track key frames - deletes all track key frames from the sequence.                                                                                                                                                                                                                                                                                                                                    |
|  | deleteAll             | N/A           | Delete all track and user key frames - deletes both track key frames and user key frames.                                                                                                                                                                                                                                                                                                                        |
| Type                                                                               | wireType              | Three Points  | Controls the number of points on the on-screen wire tool. Choose the number of points needed to describe the wire you wish to remove. <ul style="list-style-type: none"> <li>• <b>Two Points</b> - choose this if your wire is straight.</li> <li>• <b>Three Points</b> - choose this if your wire is a simple curve.</li> <li>• <b>Five Points</b> - choose this if your wire has an s-shaped curve.</li> </ul> |
| On-Screen Wire                                                                     | onScreenWire          | Show          | Sets the display mode for the on-screen wire tool. <ul style="list-style-type: none"> <li>• <b>Show</b> - shows both points and lines.</li> <li>• <b>Hide</b> - hides both points and lines.</li> <li>• <b>Points only</b> - only shows the points.</li> </ul>                                                                                                                                                   |
| Show On Screen                                                                     | showUI                | disabled      | Shows or hides the tracker panel in the Viewer.                                                                                                                                                                                                                                                                                                                                                                  |

| Control (UI) | Knob (Scripting) | Default Value     | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Controls     |                  |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Output       | output           | Source            | <p>Sets the output mode for F_WireRemoval.</p> <ul style="list-style-type: none"> <li>• <b>Source</b> - output the untouched source image. Use this output mode to position the on-screen wire tool over the wire you wish to remove.</li> <li>• <b>Repair</b> - output the repaired source image, with the wire removed from under the on-screen tool.</li> <li>• <b>Wire Matte</b> - renders a matte for the wire. This may be useful if the wire has been tracked but cannot be repaired using F_WireRemoval and other techniques have to be used.</li> <li>• <b>Repair Matted</b> - output the repaired source image and a matte in the alpha channel. If you want, you can manually adjust your image further using the matte.</li> </ul> |
| Track Range  | range            | Source Clip Range | <p>Sets the range of frames to track the wire over.</p> <ul style="list-style-type: none"> <li>• <b>Specified Range</b> - use the <b>Track Start</b> and <b>Track End</b> controls to specify the range over which to track the wire.</li> <li>• <b>Source Clip Range</b> - track the wire over the entire range of the Source clip.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                |
| Track Start  | start            | 0                 | <p>Specifies the start of the tracking range when <b>Track Range</b> is set to <b>SpecifiedRange</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Track End    | end              | 100               | <p>Specifies the end of the tracking range when <b>Track Range</b> is set to <b>SpecifiedRange</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Repair       | repairMethod     | Spatial           | <p>Sets the algorithm used to remove the wire from under the grain:</p> <ul style="list-style-type: none"> <li>• <b>Spatial</b> - this method uses a slope dependent filter that interpolates across the wire at the most likely angle, given the image behind the wire. It uses information from the current frame</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Control (UI)      | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                  |               | <p>only.</p> <ul style="list-style-type: none"> <li>• <b>Temporal With Static Scene</b> - this method uses LME to align frames from before and after onto the current frame. This is useful for sequences where the wire is moving and where the motion in the rest of the scene is non-uniform.</li> <li>• <b>Temporal With Moving Scene</b> - also aligns frames from before and after onto the current frame, but uses GME. This is useful for sequences where the wire is moving and the motion in the rest of the scene is fairly uniform.</li> <li>• <b>Clean Plate</b> - choose this method if you have a clean plate you wish to use for the repair, or if F_WireRemoval does not do a good job of removing the wire from each frame.</li> </ul> |
| Filter Size       | filterSize       | 5             | If the wire you are trying to remove has details within it (for example, a steel wire in which the twisted threads are reflecting light), then the algorithm may leave these alone, thinking that they are grain. In this situation, you can decrease the filter size.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Temporal Offset   | tempOffset       | 1             | Sets the time offset of the additional frames to use for the <b>Temporal With Static Scene</b> or <b>Temporal With Moving Scene</b> methods. This determines which two frames before and after the current frame are used to fill in the background behind the wire.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Luminance Correct | lumCorrect       | disabled      | Enable this where there are global luminance shifts between one frame of the sequence and the next, or between a frame of the sequence and a clean plate you are using for the repair.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)   | Knob (Scripting) | Default Value | Function                                                                                                                                                                                      |
|----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                  |               |  <b>Note:</b> The <b>Spatial</b> repair mode does not benefit from <b>Luminance Correction</b> .             |
| Lum Block Size | lumBlockSize     | 31.12         | Altering the <b>Lum Block Size</b> could produce a better result if <b>Luminance Correction</b> is not performing as expected.                                                                |
| Points         |                  |               |                                                                                                                                                                                               |
| Point 1        | point1           | N/A           | The position of the start point on the wire.                                                                                                                                                  |
| Point 2        | point2           | N/A           | <p>The position of the point on the wire between the start point and the mid point.</p> <p>This is only active if <b>Type</b> is set to <b>Five Points</b>.</p>                               |
| Point 3        | point3           | N/A           | The position of the mid point on the wire.                                                                                                                                                    |
| Point 4        | point4           | N/A           | <p>The position of the point on the wire between the mid point and the end point.</p> <p>This is only active if <b>Type</b> is set to <b>Five Points</b>.</p>                                 |
| Point 5        | point5           | N/A           | The position of the end point on the wire.                                                                                                                                                    |
| Start Width    | startWidth       | 15.56         | The width of the wire at Point 1 of the on-screen wire tool.                                                                                                                                  |
| End Width      | endWidth         | 15.56         | The width of the wire at Point 5 of the on-screen wire tool. This allows you to make your repair region wider at one end than the other, for example, where there is motion blur on the wire. |
| Overall Width  | overallWidth     | 15.56         | Alter the width of the repair region along its entire length, and for all key frames.                                                                                                         |
| About          | about            | N/A           | Displays a dialog containing information about this node.                                                                                                                                     |



# AIR Machine Learning Nodes

AIR nodes are Machine Learning tools designed to assist artists with some of the heavy-lifting in VFX work.

## CatFileCreator

CatFileCreator gives you the ability to create your own custom **.cat** files from within Nuke. It also allows you to attach user knobs to your **.cat** files so that you can have complete control over your machine learning models via the Inference node.



**Warning:** It is important to note that not all PyTorch models work without modification. In order to correctly construct a TorchScript model from a PyTorch model please follow the guidelines laid out in the PyTorch user guide at <https://pytorch.org/docs/stable/jit.html> and the information provided by Foundry in the Nuke **.cat** File Creation Guide here: <https://learn.foundry.com/nuke/developers/15.2/catfilecreationreferenceguide/index.html>

## Inputs and Controls

| Control (UI)       | Knob (Scripting)    | Default Value | Function                                                                                                     |
|--------------------|---------------------|---------------|--------------------------------------------------------------------------------------------------------------|
| CatFileCreator Tab |                     |               |                                                                                                              |
| TorchScriptFile    | torchScriptFileKnob | none          | Specifies the file path to the <b>.pt</b> TorchScript model that you want to encode in the <b>.cat</b> file. |
| Cat File           | catFileKnob         | none          | Specifies the file path to the <b>.cat</b> file generated from the <b>.pt</b> file.                          |
| Channels In        | channelsInKnob      | none          | A comma separated list that defines the names of the input channels that your model uses.                    |

| Control (UI)                                                                                                                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Channels Out                                                                                                                                                                                                                                           | channelsOuKnob    | none          | A comma separated list that defines the names of the output channels that your model uses.                                                                                                                                                                                                                                                                                                                                                                                                                     |
|  <b>Note:</b> Please refer to appendix in the Nuke <a href="#">CatFile Creation Reference Guide</a> for the correct channel names and the order in which to use them. |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Model ID                                                                                                                                                                                                                                               | modelIdKnob       | none          | <p>An optional user-defined ID to identify the model encoded in the <b>.cat</b> file.</p> <p>Leaving this field blank stores an empty string in the <b>.cat</b> file.</p>                                                                                                                                                                                                                                                                                                                                      |
| Output Scale                                                                                                                                                                                                                                           | Output Scale      | 1             | <p>Defines how much the width and height of the input images are scaled by the model. For example, setting the <b>Output Scale</b> to 1.5 would mean that you are expecting the model to scale up the input by 50% so that a 512x512 input image would create a 768x768 output.</p> <div>  <b>Tip:</b> Click the <b>2</b> button in the <b>Properties</b> panel to scale the width and height independently.         </div> |
| Create .cat file and Inference                                                                                                                                                                                                                         | createCatFileKnob | N/A           | Click to create a <b>.cat</b> file from the specified <b>.pt</b> file and an Inference node. The Inference node references the new <b>.cat</b> file automatically.                                                                                                                                                                                                                                                                                                                                             |

# CopyCat

CopyCat (NukeX and Nuke Studio only) copies sequence-specific effects, such as garbage matting, beauty repairs, or deblurring, from a small number of frames in a sequence and then trains a network to replicate this effect on the full sequence. CopyCat outputs a trained network in a **.cat** file ready for the Inference node to apply your effect.

See also [Inference](#).

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | Input           | The image sequence before any effects have been applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                 | Ground Truth    | The image sequence after the required effects have been applied. This input describes what the network is attempting to learn.                                                                                                                                                                                                                                                                                                                                                                                         |
|                 | Preview         | <p>An optional sample image overlay. This input is used to view how the model will work when applied to a frame that is not part of the data set you're using to train the model. As the training progresses, the <b>Preview</b> image should move toward the ideal result defined by the <b>Ground Truth</b>.</p> <div>  <b>Note:</b> This input is only visible when the <b>Input</b> and <b>Ground Truth</b> are connected. </div> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CopyCat Tab  |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Local GPU    | gpuName          | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b></p> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p>dropdown.</p> <p>Selecting a different GPU requires you to restart Nuke before the change takes effect.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Use GPU if available | useGPUIfAvailable | on            | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| Data Directory       | dataDirectory     | N/A           | Sets the location to which CopyCat writes contact sheets and <b>.cat</b> files for use with an Inference node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Epochs               | epochs            | 10000         | Sets the number of times CopyCat processes the entire data set during training. Higher values generally produce better trained networks, but at the cost of longer processing time.                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI)     | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                     |
|------------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Channels         | trainingInfo     | none          | Read-only information about the current training model:<br><ul style="list-style-type: none"> <li>• <b>Channels</b> - the channels to process from the <b>Input</b> and <b>Ground Truth</b> respectively.</li> <li>• <b>Batch Size</b> - the <b>Advanced</b> &gt; <b>Batch Size</b> dropdown controls this field.</li> </ul> |
| Batch Size       |                  | 0 (Auto)      | <ul style="list-style-type: none"> <li>• <b>Total Steps</b> - the number of steps required to complete the specified number of <b>Epochs</b>. At each step, CopyCat trains the network using random crop pairs from the <b>Input</b> and <b>Ground Truth</b> images divided by the <b>Batch Size</b>.</li> </ul>             |
| Total Steps      |                  | N/A           | <p>Total Steps = Epochs * (Data Set) / (Batch Size)</p> <p>The <b>Data Set</b> is the number of <b>Input</b> and <b>Ground Truth</b> image pairs connected to CopyCat.</p>                                                                                                                                                   |
| Start Training   | startTraining    | N/A           | Click to start training the network using the current settings.                                                                                                                                                                                                                                                              |
| Resume Training  | resumeTraining   | N/A           | Click to resume training from a checkpoint recorded in the <b>Data Directory</b> .                                                                                                                                                                                                                                           |
| Create Inference | createInference  | N/A           | Click to add an Inference node to the Node Graph with the <b>Model File</b> control automatically referencing the correct <b>.cat</b> file for this CopyCat node.                                                                                                                                                            |
| Advanced         |                  |               |                                                                                                                                                                                                                                                                                                                              |
| Initial Weights  | initialWeights   | None          | Sets whether training begins from scratch or from weighting defined by a previous model:<br><ul style="list-style-type: none"> <li>• <b>None</b> - the training begins from scratch with no weighting applied.</li> <li>• <b>Checkpoint</b> - the training uses weighting</li> </ul>                                         |

| Control (UI)    | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                  |               | <p>from a previously trained <b>.cat</b> file, which is saved to the <b>Data Directory</b> every 1000 steps by default.</p> <div>  <b>Tip:</b> You can change how often checkpoints are created using the <b>Checkpoint Interval</b> control. </div> <ul style="list-style-type: none"> <li>• <b>Deblur</b> - the training starts with a model weighted towards deblur effects, which can improve the training results for similar operations.</li> <li>• <b>Upscale</b> - the training starts with a model weighted towards upscaling, which can improve the training results for similar operations.</li> <li>• <b>Human Matting</b> - the training starts with a model weighted towards rotoscoping humanoid shapes, which can improve the training results for similar operations. This checkpoint is available in <b>large</b>, <b>medium</b> and <b>small</b> model sizes (see Model Size).</li> </ul> |
| Checkpoint File | checkpointFile   | N/A           | When <b>Initial Weights</b> is set to <b>Checkpoint</b> , enter the location of the <b>.cat</b> file to use as the weighting when training resumes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Model Size      | modelSize        | Medium        | Allows you to trade off speed and memory use against potentially better results. <b>Small</b> models are faster to train and use the least GPU memory, but <b>Large</b> models may produce better results on complex tasks such as beauty work or when attempting to generalize for multiple shots.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Batch Size      | batchSizeType    | Auto          | Sets the number of image pairs to train the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <p>network with at each <b>Epoch</b> and is used to calculate the <b>Total Steps</b> required to complete the training run.</p> $\text{Total Steps} = \text{Epochs} * (\text{Data Set Size}) / (\text{Batch Size})$ <p>The <b>Batch Size</b> is calculated automatically using the available GPU memory by default.</p>                                                                                                                                                                                                                                  |
|              | batchSize        | N/A           | <p>When <b>Batch Size</b> is set to <b>Manual</b>, enter the batch size to use.</p> <p>Smaller <b>Batch Size</b> values may cause the training to be inefficient, but larger values can cause your GPU to run out of memory. Values between 4 and 16 were found to be suitable in most scripts, depending on the data set.</p> <div>  <p><b>Note:</b> The <b>Batch Size</b> must be less than or equal to the number of image pairs in your data set.</p> </div>      |
| Crop Size    | cropSize         | 256           | <p>Defines the size of the random crops taken from the data set image pairs. Larger values generally produce more accurate results, but at the expense of processing time and memory, and smaller values may require more iterations to produce a good result.</p> <p>If you find that training takes a long time or uses too much memory, try reducing the <b>Crop Size</b> control. In our tests, the default <b>256</b> was suitable for most scripts, but data sets of larger images may require a larger <b>Crop Size</b> to train effectively.</p> |

| Control (UI)                  | Knob (Scripting)           | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|----------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Checkpoint Interval           | checkpointInterval         | 1000          | <p>Sets the number of steps between each checkpoint <b>.cat</b> file saved to the <b>Data Directory</b>.</p> <p>You can load <b>.cat</b> files into Inference nodes to check the progress of the training at each checkpoint on the full sequence.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Contact Sheet Interval        | imageInterval              | 100           | <p>Sets the number of steps between each contact sheet <b>.png</b> file saved to the <b>Data Directory</b>.</p> <p>You can examine the contact sheets to judge whether the training is progressing as expected.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Use Multi-Resolution Training | useMultiResolutionTraining | on            | <p>Enabling multi-resolution training can speed up your training by up to two times.</p> <p>It does so by splitting the training into <b>three stages - low, medium, and high</b> resolution. During the low and medium-resolution stages, the input and ground truth <b>images are downsized</b> to 1/4 and 1/2 resolution respectively, allowing for fast training. In the final <b>high-resolution stage, the model is trained on full-resolution</b> input and ground truth images as regular CopyCat does, allowing the model to learn from the fine details and achieve optimal results.</p> <p>It is recommended that you <b>disable</b> multi-resolution training when using a <b>large dataset</b> of input and ground truth images (more than 100).</p> |



| Control (UI)        | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                  |               |  <b>Note:</b> Stopping training prematurely may prevent the model training on full resolution images.                                                                                                                                                                                                                                     |
| Progress Tab        |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Runs                |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [Run Table]         | runTable         | N/A           | Displays run data for all training in the specified <b>Data Directory</b> .                                                                                                                                                                                                                                                                                                                                                |
| Live Updates        |                  | off           | <p>When on, live training data is polled from the distributed training network so that you can check training progress.</p> <p><b>Live Updates</b> is off by default to avoid unnecessary data fetching from the network.</p> <div>  <b>Note:</b> This control has no effect when you're training on your local machine.         </div> |
| Graph               |                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Log Scale           | logScale         | off           | When on, the graph y axis is converted from linear to log, which displays more detail at lower values as the training progresses.                                                                                                                                                                                                                                                                                          |
| Smoothness          | smoothness       | 0.6           | Controls the overall smoothness of the loss curve. Lower values allow you to see more accurate data points, but the overall trend can be harder to read.                                                                                                                                                                                                                                                                   |
| Show Original Curve | showOriginal     | on            | When on, the original graph before applying any smoothing is displayed as well as the smoothed graph.                                                                                                                                                                                                                                                                                                                      |
| [graph]             | N/A              | N/A           | Displays Step/Loss data for all training in the                                                                                                                                                                                                                                                                                                                                                                            |

| Control (UI)                                                                                                                                           | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                        |                   |               | <p>specified <b>Data Directory</b>.</p> <p>You can use the curve to monitor training in real-time using the zoom controls above the graph.</p>                                                                                                                                                                                     |
| Runs                                                                                                                                                   | runTable          | N/A           | <p>Displays run data for all training in the specified <b>Data Directory</b>.</p> <p>You can enable and disable curves for run individually using the checkbox on the left of each entry. You can also rename the files in the <b>Data Directory</b> by double-clicking on the <b>Name</b> field and entering your own string.</p> |
| Python Tab (These controls are for Python callbacks and can be used to have Python functions automatically called when various events happen in Nuke.) |                   |               |                                                                                                                                                                                                                                                                                                                                    |
| before render                                                                                                                                          | beforeRender      | none          | These functions run prior to starting rendering in execute(). If they throw an exception, the render aborts.                                                                                                                                                                                                                       |
| before each frame                                                                                                                                      | beforeFrameRender | none          | These functions run prior to starting rendering of each individual frame. If they throw an exception, the render aborts.                                                                                                                                                                                                           |
| after each frame                                                                                                                                       | afterFrameRender  | none          | These functions run after each frame is finished rendering. They are not called if the render aborts. If they throw an exception, the render aborts.                                                                                                                                                                               |
| after render                                                                                                                                           | afterRender       | none          | These functions run after rendering of all frames is finished. If they throw an error, the render aborts.                                                                                                                                                                                                                          |
| render progress                                                                                                                                        | renderProgress    | none          | These functions run during rendering to determine progress or failure.                                                                                                                                                                                                                                                             |

# Deblur

The Deblur node attempts to remove motion blur from the input image using a pre-trained machine learning network.



Before deblur applied



After deblur applied

## Inputs and Controls

| Connection Type | Connection Name | Function                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input           | unnamed         | The image to which the motion deblur is applied.                                                                                                                                                                                                                                                                                                                               |
|                 | mask            | <p>An optional image to use as a mask. By default, the effect is limited to the non-black areas of the mask.</p> <p>At first, the mask input appears as triangle on the right side of the node, but when you drag it, it turns into an arrow labeled <b>mask</b>. If you cannot see the mask input, ensure that the <b>mask</b> control is disabled or set to <b>none</b>.</p> |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                   |
|--------------|------------------|---------------|------------------------------------------------------------|
| Deblur Tab   |                  |               |                                                            |
| Local GPU    | gpuName          | N/A           | Displays the GPU used for rendering when <b>Use GPU if</b> |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p><b>available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <p>Selecting a different GPU requires you to restart Nuke before the change takes effect.</p> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p> |
| mask         | N/A              | disabled      | Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                               |
|              | maskChannelInput | none          | The channel to use as a mask. By default, the roto shapes are limited to the non-black areas of this channel.                                                                                                                                                                                                                                                                                                                                                                                               |
| inject       | inject           | disabled      | Copies the <b>mask</b> input to the predefined <b>mask.a</b> channel. Injecting the mask allows you to use the same                                                                                                                                                                                                                                                                                                                                                                                         |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                                                                                     |
|--------------|------------------|---------------|------------------------------------------------------------------------------------------------------------------------------|
|              |                  |               | mask downstream.                                                                                                             |
| invert       | invert_mask      | disabled      | Inverts the use of the mask channel, so that output is limited to the non-white areas of the mask.                           |
| fringe       | fringe           | disabled      | When enabled, only apply the effect to the edge of the mask.<br><br>When disabled, the effect is applied to the entire mask. |
| mix          | mix              | 1             | Dissolves between the original image at 0 and the full blur effect at 1.                                                     |

# Inference

The Inference node applies a **.cat** file supplied by the CopyCat node to create the effect modeled by the network across the input image.

See [CopyCat](#) for more information.

## Inputs and Controls

| Connection Type | Connection Name | Function                                                    |
|-----------------|-----------------|-------------------------------------------------------------|
| Input           | Input           | The image to which the CopyCat <b>.cat</b> file is applied. |

| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inference Tab        |                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Local GPU            | gpuName           | N/A           | <p>Displays the GPU used for rendering when <b>Use GPU if available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <div>  <b>Note:</b> Selecting a different GPU requires you to restart Nuke before the change takes effect. </div> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option. </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                                                                                                                                                                                               |
| Model File           | modelFile         | N/A           | The path to the CopyCat <b>.cat</b> file you want to use to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Control (UI)                  | Knob (Scripting)   | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------|--------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               |                    |               | <p>apply the effect modeled by the network.</p> <p>You can enter the file path manually or click the directory icon to browse to the <b>.cat</b> file's location.</p>                                                                                                                                                                                                                                                                                                    |
| Optimize for Speed and Memory | inferencePrecision | disabled      | <p>When enabled, use 16-bit half-float precision instead of Nuke's standard 32-bit float precision.</p> <p>Enabling this control produces results more quickly, uses less GPU memory, and can handle larger images, but can result in artifacts with some trained networks.</p> <div>  <b>Note:</b> This control is hidden when <b>Use GPU if available</b> is disabled.         </div> |

# Upscale

The Upscale node increases the input format by a factor of two using a pre-trained machine learning network. For example, an input image at 1920x1080 upscales to a 3840x2160 output image.

## Inputs and Controls

| Connection Type | Connection Name | Function                                     |
|-----------------|-----------------|----------------------------------------------|
| Input           | Source          | The image to which the upscaling is applied. |

| Control (UI) | Knob (Scripting) | Default Value | Function                                                   |
|--------------|------------------|---------------|------------------------------------------------------------|
| Upscale Tab  |                  |               |                                                            |
| Local GPU    | gpuName          | N/A           | Displays the GPU used for rendering when <b>Use GPU if</b> |



| Control (UI)         | Knob (Scripting)  | Default Value | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|-------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      |                   |               | <p><b>available</b> is enabled. Local GPU displays <b>Not available</b> when:</p> <ul style="list-style-type: none"> <li>• <b>Use CPU</b> is selected as the <b>default blink device</b> in the <b>Preferences</b>.</li> <li>• no suitable GPU was found on your system.</li> <li>• it was not possible to create a context for processing on the selected GPU, such as when there is not enough free memory available on the GPU.</li> </ul> <p>You can select a different GPU, if available, by navigating to the <b>Preferences</b> and selecting an alternative from the <b>default blink device</b> dropdown.</p> <p>Selecting a different GPU requires you to restart Nuke before the change takes effect.</p> |
| Use GPU if available | useGPUIfAvailable | enabled       | <p>When enabled, rendering occurs on the <b>Local GPU</b> specified, if available, rather than the CPU.</p> <div>  <p><b>Note:</b> Enabling this option with no local GPU allows the script to run on the GPU whenever the script is opened on a machine that does have a GPU available. You should also select this if you wish to render from the command line with the <b>--gpu</b> option.</p> </div> <p>See Nuke's <a href="#">Release Notes</a> pages for more information on the GPUs supported by your operating system.</p>                                                                                              |
| Tile Size            | tileSize          | None          | <p>Controls how the input image is upscaled:</p> <ul style="list-style-type: none"> <li>• <b>None</b> - the full image is processed at once, which can use a large amount of GPU memory depending on the image size.</li> <li>• <b>1024, 2048, 4096</b> - the image is processed in tiles of the selected size. These options allow you to process</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |

| Control (UI) | Knob (Scripting) | Default Value | Function                                          |
|--------------|------------------|---------------|---------------------------------------------------|
|              |                  |               | large images on machines with limited GPU memory. |