REFERENCE GUIDE

VERSION 16.1v5

FOUNDRY.

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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.

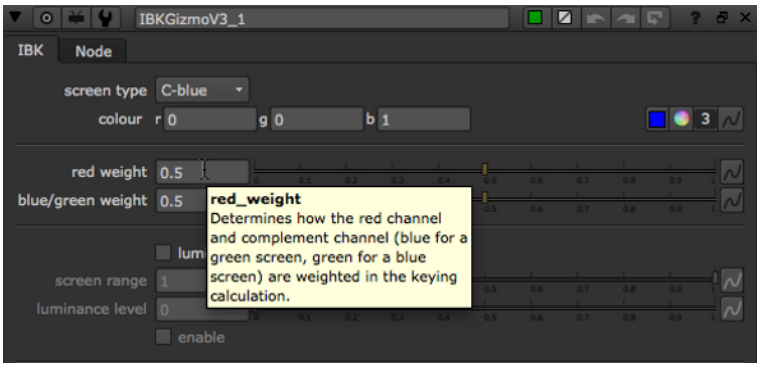
Note: For the most up-to-date information, please see the Nuke product page and the latest Nuke Online Help on our website at www.foundry.com.

Getting Help

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

Viewing Tooltips

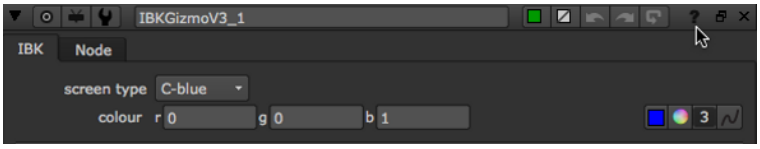
Most controls offer concise instructions in the form of tooltips. To display the tooltips, move your mouse pointer over an interface control or a node parameter.



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\16.1\plugins\
   - On Mac, this is /Library/Application Support/Nuke/16.1/plugins/
   - On Linux, this is /usr/local/Nuke/16.1/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.

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 **Project Settings**	Sets the checkerboard's format. You can select a preset format or create a custom size using the **new** or **edit** 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: • **color 0** - the box at 0,0 and then every alternate box and row. • **color 1** - the box at 1,0 and then every alternate box and row. • **color 2** - the box at 1,1 and then every alternate box and row. • **color 3** - the box at 0,1 and then every alternate box and row.
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 **Project Settings**	Sets the colorbar's format. You can select a preset format or create a custom size using the **new** or **edit** 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 **Project Settings**	Sets the color wheel's format. You can select a preset format or create a custom size using the **new** or **edit** options.
channels	channels	rgba	The color wheel only contains these channels. If you set this to something other than **all** or **none**, 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	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. When disabled, use the area controls to specify the color wheel's area.
area xyrt (xywh)	area	N/A	Sets the area of the color wheel when **fill format** is disabled. **Note:** Click **wh** to toggle between xyrt and xywh area controls.

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. If you set this to something other than **all** or **none**, 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 **Project Settings**	Sets the constant's format. You can select a preset format or create a custom size using the **new** or **edit** 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	Sets the curve type to pass down the node tree: • **Auto Crop** - 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. • **Avg Intensities** - 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. • **Exposure Difference** - 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. • **Max Luma Pixel** - tracks the brightest and dimmest pixels in the frame sequence. This can be useful in the following case, for example. Let's

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 **Curve Type**.
AutoCrop			
color	color	0	Sets the color detected during analysis.
Intensity Range	ccrange	0	Sets how far the color can deviate from the selected **color** and still be cropped.
Intensity			
# frames for base average	avgframes	2	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. **Note:** The higher frame range you use, the more accurate and time-consuming the calculation becomes.

Control (UI)	Knob (Scripting)	Default Value	Function
All			
channels	channels	rgba	The selected analysis is only applied to these channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
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 **Curve Type** is set to **AutoCrop**. To see the animation curve, right-click on a parameter field and select **Curve editor**.
IntensityData Tab			
intensitydata	intensitydata	0	Displays the analysis results when **Curve Type** is set to **Avg Intensities**, or **Exposure Difference**. To see the animation curve, right-click on a parameter field and select **Curve editor**.
MaxLumaData Tab			
Maximum Luminence Pixel xy	maxlumapixdata	0, 0	Displays the coordinates of the pixel with the highest luminance value on the current frame.
Maximum Luminence Pixel Value	maxlumapixvalue	0	Displays the highest luminance value on the current frame.
Minimum Luminence 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 Luminence 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	The profiling data is only calculated for these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **Profile** 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	Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times: • **on** - the files are cached, regardless of location, as long as the **limit to (GB)** limit is not breached. • **from auto-localize path** - the files are cached if they reside in the **auto-localize from** directory, as long as the **limit to (GB)** limit is not breached. • **on demand** - only localize these source clips when you manually update them. See Nuke's Online Help for more information. • **off** - the files are never cached, regardless of location.

Control (UI)	Knob (Scripting)	Default Value	Function
Update	updateLocalization	N/A	When this Read node is set to **Localization Policy** > **on demand**, click **Update** 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 **Format** dropdown and selecting **new** or **edit** 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 **proxy** mode is on and the required resolution is less than or equal to the **proxy format**.
Proxy Format	proxy_format	1024x778	The file specified in **proxy** is read if the **down-rez** 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	Sets the behavior of frames before the **first** frame specified: • **hold** - select to show a still picture of the first frame of the frame range. • **loop** - select to start over and keep looping the span of the frame range outside the first frame of the frame range. • **bounce** - select to play the span of the frame range backwards and forwards between the frame range limits. • **black** - select to display a black frame outside of the first frame.

Control (UI)	Knob (Scripting)	Default Value	Function
	last	dependent on file	The last frame number of a sequence to display.
	after	hold	Sets the behavior of frames after the **last** frame specified: • **hold** - select to show a still picture of the last frame of the frame range. • **loop** - select to start over and keep looping the span of the frame range outside the last frame of the frame range. • **bounce** - select to play the span of the frame range backwards and forwards between the frame range limits. • **black** - select to display a black frame outside of the last frame.
Frame	frame_mode	expression	Sets the frame mode: • **expression** - 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 **frame+499**. 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 **frame*2**. 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. • **startat** - Lets you enter a start frame number in the

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **1** in the field, image0500.rgb is read in at frame 1. Similarly, if you enter **100** in the field, image0500.rgb is read in at frame 100. • **offset** - 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 **499** 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.
	frame	none	Depending on the **frame** 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	Sets Nuke's behavior when there is a problem with frames in the file: • **error** - display an error in the Viewer.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **black** - replace suspect frames with a black frame. • **checkerboard** - replace suspect frames with a checkerboard. • **nearestframe** - replace suspect frames with the nearest good frame.
reload	reload	N/A	Click to re-read the image from disk.
Input Transform	colorspace	dependent on file	Sets the color transform used to convert this file to Nuke's **working space**. The **working space** is defined in the **Preferences** or **Project Settings** > **Color Management** settings. The **default** determines the LUT from the size and type of data in the file, and other information from the file header. **Note:** The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.
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	When enabled, Nuke does not convert the data. For most file formats this is the same as **linear** colorspace but, for some, it may disable other processing such as conversion from YUV.
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. See Nuke's online help 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	Click to display a browser to locate an import sequence script which builds a frame sequence list from the contents of an EDL file.
			
			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:
			`imagesequence.%04d.ext in out head tail`
			
			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.
			
			Each sequence in the list is expanded into the **sequence** control so that each line contains the name of the file to read for that frame:
			`line 1 = frame 1, line 10 = frame 10.`
			
			Finally, the script replaces the **Read** > **file** text with:
			`[lindex [knob sequence] [frame]]`

Control (UI)	Knob (Scripting)	Default Value	Function
			This looks up the file name from the **sequence** control and sets the **first** frame to 1 through to the **last** frame in the expanded list.
frame sequence	sequence	none	Most easily used in conjunction with the **import sequence** button. Each line contains the name of the file to read for that frame: line 1 = frame 1, line 10 = frame 10. Set the **Read** > **file** control to **[lindex [knob sequence] [frame]]** 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.
Metadata Tab			
metadata viewer	shownmetadata	N/A	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. The metadata displayed depends on the file type. For example, a **.jpg** might only contain **input/** keys, whereas QuickTimes contain **input/** and **quicktime/** keys.
search metadata for	metadatafilter	N/A	Filter the metadata by entering text in this field. By default, only metadata containing the **keys** and

Control (UI)	Knob (Scripting)	Default Value	Function
			values entered are displayed. You can change this behavior using the **within** 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
ARI Options (ARI and MXF)			
Load settings from metadata	arriReset	N/A	Click to reset the **ARI Options** to those from the file metadata.
Local GPU	arriLocalGPUName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	arriUseCuda	disabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
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 **White Balance** 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	When enabled, unsqueezes the raw file while converting it to the Viewer colorspace. **Note:** This control is generally not required because the file metadata sets the pixel aspect ratio automatically.
Processing			
Debayer Mode	arriDebayerMode	dependent on clip	Sets the debayering mode applied to reads. If **Proxy Playback** is enabled, the debayer is ignored.
ADA 5 Fine-tuning	arriAda5FinetuningRed arriAda5FinetuningGreen 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		Adjusts the amount of detail by affecting fine structures. **Note:** The **Detail** control can introduce aliasing at higher values.

Control (UI)	Knob (Scripting)	Default Value	Function
Look Editor			
Use Look Editor	arriUseLookEditor	enabled	When enabled, the **Look Editor** settings can be used to modify the image. **Note:** The **Look Editor** settings cannot be enabled when the **Colorspace** control is set to **LogC** or **Scene Linear**. Only **Video** color spaces use **Look Editor** settings.
Saturation	arriSaturation	1	Increases or decreases the overall saturation of the image.
Slope/Offset/Power			
Slope	arriSlope	1,1,1	Adjusts overall the **Slope**, **Offset**, and **Power**.
Offset	arriOffset	0,0,0	
Power	arriPower	1,1,1	
Proxy Playback	arriProxyPlayback	Off	Setting proxy to anything other than **Off** speeds up read times, but the **Debayer Mode** 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
BRAW Options			
Local GPU	N/A	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	use_cuda	disabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your

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 **Camera Metadata** or **Clip Custom**, which enables the **Blackmagic Design Custom** controls allowing you to make changes to the output in the Viewer.
Load settings from metadata	load_settings	N/A	Click to overwrite any changes to controls in the **Properties** panel with the camera metadata stored in the file. Any changes made to the **Properties** are discarded. If you want to compare your edits to the camera metadata, set **Decode Using** to **Camera Metadata** instead. That way you can toggle between your look and the original camera metadata.
Update sidecar	update_sidecar	N/A	Click to overwrite an existing **.sidecar** file with the settings currently in the **Properties** panel. A **.sidecar** file contains artistic changes to the look of a **.braw** file, separate from the camera metadata stored in the **.braw** file. Sidecar files must reside in the same directory as the associated **.braw** file. If no **.sidecar** file exists in the same directory as the **.braw** file, Nuke creates one with the settings currently in the **Properties** panel. Clicking **Update sidecar** again overwrites the new file.
Color Science	viewing_bmdgen	5	Sets the Blackmagic color science generation applied to the clip. Only the latest color science, **Gen5**, 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 **Blackmagic Design Custom** enables the controls under the **Blackmagic Design Custom** 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
			Note: 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 **Colorspace** gamut values are remapped to fit the available color value range on the output device. **Note: Gamut Compression** is only applicable if **Use GPU if available** is enabled.
Apply LUT	apply_lut	disabled	When enabled, embedded LUTs in the metadata or separate **.sidecar** file are applied to the image. Use the **LUT Source** control to select the source of the LUT.
LUT Source	post_3dlut_mode	Disabled	When **Apply LUT** is enabled, select the source of the embedded LUT: • **Disabled** - no LUT is applied. This option is equivalent to disabling **Apply LUT**. • **Embedded** - the LUT embedded in the file metadata is applied. If no embedded LUT exists, this option is not displayed. • **Sidecar** - the LUT embedded in the associated **.sidecar** file is applied. If no embedded LUT exists in the **.sidecar**, this option is not displayed.
White Balance	whiteBalance	As Shot	Allows you to select a preset white balance from the

Control (UI)	Knob (Scripting)	Default Value	Function
			dropdown, such as **Cloudy** or **Flash** simulation, or choose **Custom** to adjust the **White Balance (K)** and **Tint** manually. The default, **As Shot**, uses the **White Balance (K)** and **Tint** values from the file metadata or **.sidecar**.
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
DNG Options			
color space	dng_colorspace	sRGB	Sets the colorspace used during debayering. The standard Read node **colorspace** control is changed to match this setting automatically. **Note:** To view the data before debayering, enable the **raw data** control.
force linear transfer function	dng_force_linear	disabled	When enabled, overrides the specified **color space** transfer function to force it to use linear. For some cases, such as **sRGB**, this results in slightly faster read times and sets the **colorspace** on the Read to **linear** as well. As a result of forcing linear, all render settings are applied in linear space, rather than the native space,

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 **temperature** and **tint** controls, depending on the setting chosen: • **As Shot** - attempts to read the **temperature** and **tint** values from the source file's metadata. • **Daylight to Flash** - standard presets in common usage. • **Custom** - adjusting the **temperature** and **tint** controls manually sets **white balance** to this value.
temperature	dng_temperature	dependent on file	Defines the **temperature**, in Kelvin, and **tint** of the image white point: • **temperature** - in general, runs from blues at low values to yellows at high values. • **tint** - in general, runs from greens at low values to purples at high values.
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
EXR Options			
offset negative display window	offset_negative_ display_window	enabled	The **.exr** 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
			format size on both sides: • **enabled** - the image is offset so that the **.exr** image's left side start at x=0. • **disabled** - the format is reduced on both sides by the negative x amount, as if that area was overscan.
do not attach prefix	noprefix	disabled	When enabled, metadata keys are read as they are, without attaching a prefix to them. When disabled, the prefix **exr** is attached to metadata keys to make them distinct from other metadata in the tree.
edge pixels	edge_pixels	plate detect	Sets how to treat pixels at the edges of the data window, or bounding box in Nuke terms, when reading **.exr** files: • **plate detect** - if the bounding box and format match exactly, then repeat all edges. Otherwise, add black at the edges. • **edge detect** - for each matching edge, repeat the edge pixels. Add black at mismatched edges. • **repeat** - always repeat the edge pixels outside the bounding box. • **black** - always add black pixels outside the bounding box.

MOV

Control (UI)	Knob (Scripting)	Default Value	Function
MOV Options			
YCbCr matrix	mov64_ycbcr_ matrix	dependent on the file	Sets the way Y'CbCr is converted to RGB. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Rec 2020**

Control (UI)	Knob (Scripting)	Default Value	Function
			can be used for HDR.
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 **Video Range** to decode the full range (0-255 for 8-bit or 0-1023 for 10-bit).
first track only	mov64_first_track_only	enabled	When enabled, only the first view present in the file is displayed, regardless of how many views the file contains. 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.
[Metadata] Do not attach prefix	mov64_no_prefix	disabled	When enabled, the metadata accompanying the file is saved without the **quicktime** prefix. **Note:** QuickTime container-specific metadata always carries the prefix. When disabled, all metadata is prefixed with **quicktime** for easy identification.
[Metadata] Match key format	mov64_match_meta_format	enabled	When enabled, Nuke attempts to clean up meta keys into the standard Nuke metadata format. When disabled, the metadata is passed down the Node Graph unchanged.
Video Codec	mov64_codec_name	N/A	Displays the codec used to encode the clip.

PSD

Control (UI)	Knob (Scripting)	Default Value	Function
PSD Options			
Breakout Layers	breakout	N/A	Breaks out the **.psd** 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. It's recommended that all masks and adjustment layers are rasterized in Photoshop® before they're imported into Nuke.

R3D

Control (UI)	Knob (Scripting)	Default Value	Function
R3D Options			
Image Pipeline	r3dImagePipeline	dependent on file	Sets the image pipeline to use in the Read node, **IPP2**, **IPP2 Custom**, or **legacy**. The selected **Image Pipeline** defines which controls are available in the **Properties** panel and is initially set by the file's metadata. See IPP2 Controls and Legacy Controls.
Load Settings from RMD	r3dLoadRMD	N/A	Click to reload control values from the **.rmd** file metadata.
Local GPU	r3dLocalGPUName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default**

Control (UI)	Knob (Scripting)	Default Value	Function
			blink device in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	r3dUseCUDA	disabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for

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 **Decode Resolution** is set to **rocket custom**, 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	Sets how the high and low exposure tracks are blended for HDR clips: • **A frame** - only displays the normally exposed track with standard motion blur. • **X frame** - only displays the under exposed, sharper reference track. • **simple blend** - enables the **Blend Bias** control allowing you to blend of high and low exposure according to the bias. • **magic motion** - a more sophisticated automatic blend mode with a sharper image and more natural motion blur.
Blend Bias	r3dBlendBias	0	When **HDR Mode** is set to **simple blend**, 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.
IPP2 Controls			
Demosaic			
Denoise	r3dIPP2Denoise	0	Controls the amount of noise reduction applied to the image if **Chroma Noise Reduction** is disabled.
Chroma Noise Reduction	r3dIPP2Cnr	enabled	When enabled, applies chroma noise reduction instead of the standard **.r3d Denoise**. **Note: Chroma Noise Reduction** is only available with **Decode Resolution** set to **full high** or **half high**.
Primary			
Color Space	r3dIPP2Colorspace	REDWideGamutRGB	This control is display only for the IPP2 **Image Pipeline**.
Gamma Curve	r3dIPP2GammaCurve	Log3G10	This control is display only for the IPP2 **Image Pipeline**.
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 **FLUT Control** in the legacy **Image Pipeline**.
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 **3D LUT** 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 **CDL** field is applied to the image.
Slope	r3dSlope	1,1,1,0	Adjusts the **Slope**, **Offset**, **Power**, and **Saturation** manually. 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. **Note: Contrast** is disabled when **Gamma Curve** is set to **Half Float Linear**.
Export Pipeline	r3dExportPipeline	full graded IPP2 mode	Controls whether or not creative color decisions are applied on export: • **primary raw development** - all

Control (UI)	Knob (Scripting)	Default Value	Function
			Grading settings are ignored on export. • **full graded IPP2 mode** - all **Grading** settings are applied on export.
Legacy Controls			
Look			
Color Version	r3dColorVersion	v2	Sets the color version used by the decoder.
Color Space	r3dColorSpace	dependent on clip	Sets the colorspace used to convert from raw data into the Viewer colorspace. **Note:** Colorspaces listed in brackets are deprecated in the current R3D SDK and may be removed in subsequent releases.
Gamma Curve	r3dGammaCurve	dependent on clip	Sets the gamma curve applied to the raw image data from the **.r3d** file. **Note:** Gamma Curves listed in brackets are deprecated in the current R3D SDK and may be removed in subsequent releases.
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
			Note: D.E.B. is only available for clips shot with a DRAGON sensor, or later, with **Decode Resolution** set to **full high** or **half high**.
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. **Note: FLUT Control** is only available with **Color Version** v2 or higher.
Shadow	r3dShadow	0	Sets the image black point. **Note: Shadow** is only available with **Color Version** v2 or higher. Setting **Gamma Curve** to **Half Float Linear** disables **Shadow**.
DRX	r3dDRX	0	Dynamic Range Extension (DRX) can be

Control (UI)	Knob (Scripting)	Default Value	Function
			adjusted to recover clipped highlights. **Note: DRX** is disabled for clips shot with a DRAGON sensor.
Saturation	r3dSaturation	1	Increases or decreases the overall saturation, contrast, and brightness of the image.
Contrast	r3dContrast	0	
Brightness	r3dBrightness	0	
Note: Saturation, **Contrast**, and **Brightness** are disabled when **Gamma Curve** is set to **Half Float Linear**.			
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. **Note: RGB** gain is disabled when **Gamma Curve** is set to **Half Float Linear**.
Sharpness	r3dSharpness	0	Sharpens the image to compensate for the OLPF low pass filter. **Note: Sharpness** is only applicable when **Decode Resolution** is set to **full high** or **half high**.
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 **Sharpness** 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	An optional input to add a render camera so that the Unreal scene is rendered using the input camera's **translation** and **rotation** and not the camera inside the Unreal sequence. **Note:** You can only override **translation** and **rotation** from Unreal, the other camera values are unaffected. This is a non-destructive process, the render camera does not overwrite the camera in Unreal Editor.

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

Control (UI)	Knob (Scripting)	Default Value	Function
Port	clientPort	9000	If Unreal Editor is running on a remote machine, enter the port the machine is listening on here. If Nuke and Unreal are running on the same machine, the default port is correct.
Connect to Server	connectToServer	N/A	Click to connect UnrealReader to Unreal Editor using the **Host Name** and **Port** values shown. You only need to click this button once to initialize the connection and the button is replaced by **Fetch Latest** when the connection is established.
Fetch Latest	fetchLatestBtn	N/A	When the connection to Unreal Editor is established, click **Fetch Latest** to retrieve the latest updates from the Nuke Server and populate the following fields: • Maps • Sequences • Linked Camera Output • Available Object ID Passes • OCIO settings and Custom Class Render Passes from the Unreal Engine **Nuke Server** panel
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

			* (asterisk). For example:
			`shot0*take001*v002`
			
			Matches the following string:
			`cinematics/shot001/take0014/v002`

Check Case	mapCaseSensitive	disabled	When enabled, the **Map Filter** is case-sensitive.
Map	map	none	Selects the map to use for rendering in Unreal Editor.
All Folders	mapAllFolders	disabled	When enabled, all folders are searched for maps, not just the **Project** folder. When disabled, only the **Project** folder is searched for maps.

Sequence Filter	sequenceFilter	none	Refines the available options in the **Sequence** dropdown. Searches can contain multiple words separated by the wild card character * (asterisk). For example:
			`shot0*take001*v002`
			
			Matches the following string:
			`cinematics/shot001/take0014/v002`

Check Case	sequenceCaseSensitive	disabled	When enabled, the **Sequence Filter** is case-sensitive.
Sequence	sequence	none	Selects the sequence to use for rendering in Unreal Editor.
All Folders	sequenceAllFolders	disabled	When enabled, all folders are searched for sequences, not just the **Project** folder. When disabled, only the **Project** folder is searched for sequences.

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 **Render Mode** to **stencil layers** enables the **Layers** controls in the **Render** tab in the **Properties** panel, allowing you to select which layers you want from Unreal Editor.
Render as Cubemaps	renderAsCubeMap_T	disabled	When enabled, the selected passes are rendered as cube maps producing six renders per pass. **Note:** Cryptomatte is not currently supported with cube maps.
Image Format	imageFormat	dependent on **Project Settings**	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	Sets the behavior of frames before the **startFrame**: • **hold** - the first frame in the sequence is held until the **startFrame** frame is reached. • **loop** - plays a clip loop until the **startFrame** frame is reached..

Control (UI)	Knob (Scripting)	Default Value	Function
			• **bounce** - substitutes a reversed equal number of frames, creating a clip bounce until the **startFrame** frame is reached. • **black** - frames are black until the **startFrame** frame is reached.
	endFrame	-1	The last frame of the Unreal Editor sequence.
	afterEndFrame	hold	Sets the behavior of frames after the **endFrame**: • **hold** - the last frame in the sequence is held until the **endFrame** frame is reached. • **loop** - plays a clip loop until the **endFrame** frame is reached.. • **bounce** - substitutes a reversed equal number of frames, creating a clip bounce until the **endFrame** frame is reached. • **black** - frames are black until the **endFrame** frame is reached.
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 **.exr** files are supported.
Data Type	datatype	16 bit half	Sets the bit depth of the rendered **.exr** 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: • **none** • **Zip (1 scanline)**

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Zip (16 scanline)** • **PIZ wavelet** • **RLE** • **B44** • **B44A** • **DWAA** • **DWAB**
Compression Level	dwCompressionLevel	45	Sets the quality of images compressed with the **DWAA** and **DWAB** compression types. Higher values render smaller files, but with more data loss. **Note:** This control is only available when **Compression** is set to **DWAA** or **DWAB**.
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	When enabled, clicking **Write to Disk** automatically creates a Read node referencing the output from the Unreal Movie Render Queue. 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.
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 **channels** dropdown.
Passes			
[render passes]	renderPasses	none	Select the render passes from the list of passes imported from Unreal Editor. Click the **Update Channel List** 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	Add stencils from Unreal to the **Layer List**. This uses Nuke's eyedropper color picker. Click the color swatch ■ next to **Picker Add** and **Ctrl/Cmd** + **Click** a stencil in the Viewer to add it to the selection. Selected stencils are displayed in yellow in the **Viewer**. Multiple selections can be added. Once added, stencil names are added to the **Layer List**.
Picker Remove	pickerRemove	N/A	Remove stencils from the Layer List. This uses Nuke's eyedropper color picker. Click the color swatch ■ next to **Picker Remove** and **Ctrl** + **Click** a stencil to

Control (UI)	Knob (Scripting)	Default Value	Function
			remove it from the selection. Once removed, stencil names are also removed from the **Layer List**.
Layer List	matteList	none	A list of currently selected layers. This list can be modified in text form or using the **Picker Add** and **Picker Remove** controls. The **Layer List** 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. **Note:** For more information, see Using the Matte List.
Clear	clear	N/A	Clears the **Layer List**. All stencils are deselected.
Remove Layer Occlusion	removeLayerOcclusion	disabled	When enabled, occlusions are removed from stencil layers. Layers that occlude layers selected in the **Layer List** are hidden and their reflections removed before rendering the output. When disabled, occlusions are baked into the rendered output.
Remove Occluding Layer Shadows	removeOccludingLayerShadows	disabled	When **Remove Layer Occlusion** is active, enabling this control removes shadows cast by hidden occluding layers. When disabled, hidden layers cast shadows as normal.

Control (UI)	Knob (Scripting)	Default Value	Function
Advanced Tab			
Deferred Rendering			
Accumulator Includes Alpha	accumulatorIncludesAlpha	disabled	When enabled, multiple temporal or spatial sample accumulation includes an alpha channel. To use this control, **r.Postprocessing.propagateAlpha** must be set to 1 or 2 in Unreal Editor. **Note:** Enabling this control increases processing time considerably.
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	Allows you to choose the segmentation type for the Cryptomatte render pass from your Unreal scene. Among the options available for Cryptomatte division are **per actor**, **per folder**, and **per material**. This control on applies to Cryptomatte layers selected in the **Render Passes** table.
Anti-aliasing			
Spatial	spatialSampleCount	1	Sets the number of frames used to create

Control (UI)	Knob (Scripting)	Default Value	Function
Sample Count			one overall sample. Higher values increase anti-aliasing quality at the expense of processing time.
Temporal Sample Count	temporalSampleCount	1	Sets the number of frames used to produce each output frame by blending the value of sub-steps specified. Higher values increase anti-aliasing quality at the expense of processing time.
Anti-aliasing Method	antiAliasingMethod	use UE4 setting	Sets the anti-aliasing method to use: • use UE4 setting - anti-aliasing uses the method selected in Unreal Editor. • none - no anti-aliasing is applied to the output frames. • FXAA • Temporal AA • MXAA
Render Warm Up Count	renderWarmUpCount	0	Sets the number of frames rendered and then discarded to set up a temporal history for effects such as anti-aliasing. If you're not using anti-aliasing or other temporal effects, you can use a low number of warm-up frames.
Use Camera Cut For Warm Up	useCameraCutForWarmUp	disabled	When enabled, the excess frames in the camera cut are use to determine engine warm up.
Engine Warm Up Count	engineWarmUpCount	0	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

Control (UI)	Knob (Scripting)	Default Value	Function
			process before rendering the frames in Nuke.
Render Warm Up Frames	renderWarmUpFrames	disabled	When enabled, the warm-up frames are processed on the GPU. 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.
Camera			
Shutter Timing	shutterTiming	frame center	Sets a timing bias on the shutter angle: • **frame open** - the motion to produce a frame represents the time from when the frame is rendered and onwards. • **frame center** - the motion to produce a frame represents half the time before the frame and half the time after the frame is rendered. • **frame close** - the motion to produce a frame comes from before and up to the frame being rendered.
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. Disable this control if you want to write out linear **.exr** 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 **override view distance scale** 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. 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 **Spatial Samples Count**.
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 **override subsurface scattering** 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, 18.67	Displayed aperture information from the Unreal Editor camera.
Create Camera	createCameraBtn	N/A	Click to create a corresponding Camera node in Nuke with the same translate, rotate, and camera lens details. The new camera does not affect the camera in Unreal Editor, but it is linked to it through an expression by default.
Link Output	linkOutput	enabled	When enabled, clicking **Create Camera** adds a Camera node to the Node Graph with an expression link to the Unreal camera. When disabled, no link is created so the Nuke camera is totally independent from Unreal Editor.
[BETA] New 3D	new3D	disabled	Sets the 3D system with which the **Camera** is compatible: When enabled, clicking the **Camera** button adds a new 3D system camera to the Node Graph. New 3D system nodes are red by default. When disabled, clicking the **Camera** button adds a classic 3D system camera to the Node Graph. Classic 3D system nodes are green by default.
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. 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. If you want to restore the command after the shot is started, add a corresponding command in the **End Console Commands** 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 **Start Console Commands** 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 **frame_range**.
<< >>increment	frame_increment	10	Sets the number of frames to step through using the Viewer << and >> buttons.
channels	channels	rgba	Sets the channels to display in the viewer. You can also select a channel from a different layer to display in the alpha channel.

Control (UI)	Knob (Scripting)	Default Value	Function
clip_warning	clip_warning	no warnings	When set to **exposure**, 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	Sets the amount of gamma correction to apply to the image. Gamma correction is applied after the **gain**, **viewerprocess**, and any custom **inputprocess**.
apply LUT to color channels only	rgb_only	off	When enabled, the LUT is applied to color channels only.
downrez	downrez	1	Sets the amount of down scaling applied before display. factor to speed up rendering. You can use **downrez** to speed up rendering, but bear in mind that it is multiplied into any global **proxy** scale that may also be in effect.
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 **show overscan** ins enabled.
safe zone	safe_zone	no guides	Sets the safe zone overlay to apply to the image: • **no guides** • **title safe** • **action safe** • **format center**
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 **mask mode** dropdown.
mask mode	masking_mode	no mask	Sets the mask overlay to apply to the image: • **no mask** • **lines** • **half**

Control (UI)	Knob (Scripting)	Default Value	Function
			• **full**
center f-stop	center_fstop	8	Sets the f-stop to display when gain is set to 1. You can use zero to show stops as +/-n. **Note:** 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 pow(2,2.5) to get 5.65685
shutter angle	shutter_angle	180	Sets the camera shutter angle from 0-360 degrees. This is used in combination with the Viewer's playback **fps** setting to compute exposure values.
gl buffer depth	gl_buffer_depth	float	Sets the OpenGL buffer depth and enables the use of the GPU for the Viewer process and input process: • **byte** - converts to 8-bit with error diffusion. • **half-float** - converts to 16-bit (half) float. • **float** - uses a full 32-bit floating point texture (may be very slow on some cards). In half and full float modes, the GPU can be used to apply Viewer effects

Control (UI)	Knob (Scripting)	Default Value	Function
			like gamma and the LUT in a Viewer process. **Note:** You can choose a default value for this setting in the **Preferences** or by using **knobDefault()** in a startup script.
use GPU for viewer when possible	useGPUForViewer	on	When enabled, Viewer effects (like **gain**, **gamma**, and viewer process node) are applied using the GPU when possible. 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.
use GPU for input when possible	useGPUForInputs	on	When enabled, compute nodes connected to the Viewer input on the GPU when possible, though not all nodes have a GPU implementation.
disabled GPU dithering	disableGPUDitherForViewer	off	When enabled, GPU dithering is allowed in the Viewer (which affects half-float and float modes).
dithering algorithm	GPUDitherAlgoithmFor Viewer	high frequency	Sets the frequency of dithering applied to GPU enabled compositing Viewers, so that you can be sure you're working in a consistent environment: • **high frequency** - the default setting, applies a high frequency

Control (UI)	Knob (Scripting)	Default Value	Function
			dithering algorithm in screen space, after any viewer rescaling is applied. As you pan and zoom the Viewer, dithered pixels remain the same scale. • **low frequency** - 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. • **no dithering** - disables GPU dithering.
			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	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. **Note:** The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release. You can add your own processes to

Control (UI)	Knob (Scripting)	Default Value	Function
			the dropdown using the Python **nuke.ViewerProcess.register()** function.
input process	input_process_node	VIEWER_INPUT	Sets the name of a node to process through for viewing when the **IP** button is activated. If the node does not exist, the **IP** button has no effect.
	input_process	disabled	Applies the **input process** node before displaying the image. To define the node to use, enter its name in the **input process** field or, from the Node Graph right-click menu, select **Edit** > **Node** > **Use as Input Process**.
input process order	viewerInputOrder	before viewer process	Sets when the **input process** node specified is applied: • before viewer process. • after viewer process.
viewer selector mode	viewerSelectorMode	rectangle selection	Sets the selection mode for the current Viewer: • **rectangle selection** • **ellipse selection** • **lasso selection**
viewer transform space	viewerTransformSpace	object	Sets the transform space to use in the Viewer: • **object** - transforms in this space are relative to the object itself and its orientation. For example, translating on the X axis in **object** space might shift its position on the Z axis in **world** space.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **screen** - 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. • **world** - 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.
3D Tab			
renderer	renderer	GL	Currently, only one Hydra delegate is available in Nuke, the **GL** 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. In future releases, more render delegates will be made available.
Lighting	enableLighting	on	Enable or disable lights, materials, shadows, and progressive rendering in the 3D Viewer, depending on which 3D system you're using.
Materials	enableSceneMaterials	on	
Shadows	shadowsEnabled	on	
Progressive Rendering	progressive_rendering	on	

Control (UI)	Knob (Scripting)	Default Value	Function
Display Purposes	display_render	on	Controls whether objects with a **Purpose** assigned in the new 3D system are visible or not. **Note:** Objects with **Purpose** set to **default** are always visible in the scene.
	display_proxy	off	
	display_guides	off	
Refine Level	refine_level	0	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. **Note:** The **Refine Level** only affects the Viewer output, not the final rendered scene.
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	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. • **off** - hides all 3D objects. • **wireframe** - displays only the outlines of object geometry. • **solid** - displays all object geometry with a solid color. • **solid+lines** - displays the geometry as solid color with

Control (UI)	Knob (Scripting)	Default Value	Function
			individual object's geometry outlines. • **textured** - displays only the surface texture of objects. • **textured+lines** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change object display modes. **Note:** This setting can override individual object settings.
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 **transparency** 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 that this value are not rendered 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
			from the camera that this value are not rendered the 3D Viewer. The **far** clipping plane can be moved farther away if objects in the scene are farther away. In this case, the **near** plane is also moved so that the ratio between **near** and **far** planes is preserved.
skew order	skew_order	XY	Sets the order in which skew operations are applied. • **XY** - Skew on the X axis is applied before skew on the Y axis. • **YX** - Skew on the Y axis is applied before skew on the X axis.
Soft Selection			
Soft Select	softSelect	disabled	When enabled, soft selection is applied to any selection made in the Viewer. When disabled, selections are made in the same way as legacy versions of Nuke.
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
			add your own curve to control falloff using the **+** button. Adding a custom curve adds it to the **Falloff Curve** dropdown.
MonitorOut Tab			
Enable Monitor Out	enable	enabled	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 **Device** dropdown.
Device	device	Floating Window	Sets the Viewer output destination: • **Floating Window** - Nuke's native monitor out uses a floating monitor and does not require additional hardware. • **NDI** - 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. **Note:** To view the NDI stream, you need the NDI Monitor application installed. See NDI Monitor Out for more information. • **Dedicated Monitor Out Card** - Nuke supports various AJA and

Control (UI)	Knob (Scripting)	Default Value	Function
			Blackmagic devices that can be selected from the **Device** dropdown after installation.
Minimize with Application	minimizedWithApplication	enabled	When enabled, minimizing Nuke also minimizes the Floating Window monitor out feed. When disabled, minimizing Nuke has no effect on the Floating Window. **Note:** This control is only displayed when **Device** is set to **Floating Window**.
Input Setup			
AB Mode	monitorOutABMode	Active Buffer	Select the view mode using the **AB Mode** dropdown: • **Active Buffer** - the monitor always shows the output from the buffer currently in use by the selected Viewer. • **Buffer A** - the monitor always shows the output from the selected Viewer buffer A. • **Buffer B** - the monitor always shows the output from the selected Viewer buffer B. • **Interactive** - the monitor shows the output from the selected Viewer including the A/B player mode currently in use, such as **wipe**.
Input Process			

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

Control (UI)	Knob (Scripting)	Default Value	Function
			handy if you're using a ceiling mounted projector.
Horizontal Flop	monitorOutHorizontalFlop	disabled	Enable **Horizontal Flip** 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: • Perceptual Quantizer - the default method for viewing HDR output. • Hybrid Log Gamma - used for HLG compatible devices.

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	Sets the channels to render. If you set this to something other than **all** or **none**, 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. For frame numbers, you can use **####** for each digit or the printf-style formatting **%04d**.
proxy	proxy	none	Sets the file path and name of a relevant proxy image. This proxy image is used if **proxy** mode is on and the required resolution is less than or equal to the **proxy format**.
frame	frame_mode	expression	Sets the frame mode: • **expression** - 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 **frame-499**. 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 **frame*2**. This expression multiplies the current frame by

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **startat** - 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 **1** 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 **100** in the field, frame 500 is written out as image.0100.exr. • **offset** - 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 **-499** 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 **frame** mode, you can enter a start frame, an offset, or an expression here.
output transform	colorspace	dependent on **file type**	Sets the color transform used to convert this file from Nuke's **working space** to the values written in the file. The **working space** is defined in the **Preferences** or **Project Settings** > **Color Management**

Control (UI)	Knob (Scripting)	Default Value	Function
			settings. The **default** determines the LUT from the size and type of data in the file, and other information from the file header. **Note:** The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.
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	When enabled, Nuke does not convert the data. For most file formats this is the same as **linear** colorspace but, for some, it may disable other processing such as conversion from YUV.
views	views	dependent on Compositing environment **Project Settings**	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 online help for more information.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: If **file type** is left blank, Nuke attempts to guess the format and disables any file type specific controls.
create directories	create_directories	disabled	When enabled, the render operation creates the directory structure specified in the **file** control automatically, if it doesn't already exist. When disabled, attempting to write to non-existent directories displays an error.
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	When enabled, only frames within the **frame range** are rendered. **Note:** If the specified frames are outside the sequence range, the Write node behaves as if it is disabled.
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	Sets Nuke's behavior when there is a problem with frames in the file: • **error** - display an error in the Viewer. • **black** - render suspect frames with a black frame. • **checkerboard** - render suspect frames with a checkerboard.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **nearestframe** - render suspect frames with the nearest good frame.
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 **.dpx** 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. See Nuke's online help 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: • 8-bit • 10-bit • 12-bit • 16-bit
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 **Transfer header** in the rendered **.dpx** files. By default, Nuke attempts to set the header according to the LUT used, but the **transfer** control allows you to override this.

EXR

Control (UI)	Knob (Scripting)	Default Value	Function
write ACES compliant EXR	write_ACES_compliant_EXR	disabled	When enabled, the rendered **.exr** files are ACES compliant. • The **datatype** and **compression** controls are disabled. ACES compliant **.exr** files written from Nuke are always 16-bit half float with no compression. • An extra metadata field, **chromaticities** is written into the file. **Note:** ACES restricts EXR writing to single-layer RGB or RGBA.
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
			Note: 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 **.exr** files: • 16-bit half • 32-bit float
compression	compression	Zip (1 scanline)	Sets the compression type to apply to the rendered file. **Note:** Selecting **DWAA** or **DWAB** as the **compression** setting allows you to specify the **compression level** using a slider.
compression level	dw_compression_level	45	Specifies the amount of compression to apply if **DWAA** or **DWAB** are selected as the **compression** setting.
heroview	heroview	dependent on Compositing environment **Project Settings**	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: • no metadata • default metadata • default metadata and exr/* • all metadata except input/* • all metadata

Control (UI)	Knob (Scripting)	Default Value	Function
do not attach prefix	noprefix	disabled	When enabled, unknown metadata keys are written into the file as they are. When disabled, unknown metadata keys have the prefix **nuke** attached to them when they are written into the file.
interleave	interleave	channels, layers and views	Sets the interleave strategy for channels, layers, and views with a rendered **.exr** file. A single- or multi-part **.exr** file is created as described by the following options, with layers and parts sorted alphabetically: • **channels, layers and views** - creates a single-part **.exr** file ensuring backward compatibility with applications that use OpenEXR 1.x. • **channels and layers** - creates a multi-part **.exr** file with one part per view. This can improve Read performance as Nuke only reads the part associated with the specified view. • **channels** - creates a multi-part **.exr** with one part per layer. Interleaving is done between elements within a section (part) of **.exr** files. Interleaving channels, layers, and views is done when the whole **.exr** is written out in one large part. This is quicker for writing but it involves more work when reading only part of the data. 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.

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

GIF

Control (UI)	Knob (Scripting)	Default Value	Function
Framerate	framerate	30	Sets the number of frames per second.

JPEG

Control (UI)	Knob (Scripting)	Default Value	Function
quality	_jpeg_quality	0.75	Sets the quality of the rendered JPGs.
sub-sampling	_jpeg_sub_sampling	4:1:1	Sets the chroma sub-sampling to use, from lowest to highest quality: • 4:1:1 • 4:2:2 • 4:4:4

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 **Project Settings**	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:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Pixel bit-depth** - 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.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
Fast Start	mov64_fast_start	enabled	When enabled, MOVs are playable while still down loading during streaming.
Write	mov64_write_	enabled	When enabled, a time code track is added

Control (UI)	Knob (Scripting)	Default Value	Function
Timecode	timecode		to the rendered **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
GOP Size	mov64_gop_size	12	Sets how many frames can be placed together to form a compression GOP (group of pictures). **Note:** Use caution with this control as large alterations can stop other applications reading the rendered file.
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
Apple ProRes Codec			

Control (UI)	Knob (Scripting)	Default Value	Function
Codec Profile	mov_prores_codec_profile	ProRes 4:2:2 HQ 10-bit	Sets the codec profile to use when a ProRes codec is selected in the **Codec** control: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
YCbCr Matrix	mov64_ycbcr_matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start

Control (UI)	Knob (Scripting)	Default Value	Function
			before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Metadata Export			
Color Primaries	mov64_color_ primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and

Control (UI)	Knob (Scripting)	Default Value	Function
			white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
Avid DNxHD Codec			
Codec Profile	mov64_dnxhd_codec_profile	DNxHD 444 10-bit 440 Mbit	Sets the codec profile to use when a DNxHD codec is selected in the **Codec** control: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.

Control (UI)	Knob (Scripting)	Default Value	Function
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace

Control (UI)	Knob (Scripting)	Default Value	Function
			assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
Avid DNxHR Codec			
Codec Profile	mov64_dnxhr_codec_profile	4:4:4 12-bit	Sets the codec profile to use when a DNxHR codec is selected in the **Codec** control: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.

Control (UI)	Knob (Scripting)	Default Value	Function
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace

Control (UI)	Knob (Scripting)	Default Value	Function
			assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
H.264 Codec			
Codec Profile	mov64_h264_codec_profile	High 4:2:0 8-bit	Sets the codec profile to use when a DNxHR codec is selected in the **Codec** control: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Quality	mov64_quality	High	Selects a preset level that automatically adjusts the **Advanced** controls. Higher values produce larger files with better quality. Select **Custom** to adjust the **Advanced** controls manually.
YCbCr Matrix	mov64_ycbcr_matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including

Control (UI)	Knob (Scripting)	Default Value	Function
			Format-based, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
Fast Start	mov64_fast_start	enabled	When enabled, MOVs are playable while still down loading during streaming.
Write	mov64_write_	enabled	When enabled, a time code track is added

Control (UI)	Knob (Scripting)	Default Value	Function
Timecode	timecode		to the rendered **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
GOP Size	mov64_gop_size	12	Sets how many frames can be placed together to form a compression GOP (group of pictures). **Note:** Use caution with this control as large alterations can stop other applications reading the rendered file.
B Frames	mov64_b_frames	0	Sets the maximum number of B frames that can be consecutive in the rendered file. The default, 0, does not impose any maximum number of B frames in the output.
Bitrate	mov64_bitrate	28000	Sets the target bitrate that the codec attempts to reach, within the limits set by the **Bitrate Tolerance** and **Quantizer Min/Max** controls.
Bitrate Tolerance	mov64_bitrate_ tolerance	0	Sets the amount that the bitrate can vary from the **Bitrate** setting. Setting this tolerance too low can result in renders failing.

Control (UI)	Knob (Scripting)	Default Value	Function
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	
Metadata Export			
Color Primaries	mov64_color_ primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_ function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
Motion JPEG A Codec			
Pixel Format	mov64_pixel_format	YCbCr 4:4:4 8-bit	Lists pixel formats supported by the current codec: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Quality	mov64_quality	High	Selects a preset level that automatically adjusts the **Advanced** controls. Higher values produce larger files with better

Control (UI)	Knob (Scripting)	Default Value	Function
			quality. Select **Custom** to adjust the **Advanced** controls manually.
YCbCr Matrix	mov64_ycbcr_ matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Bitrate	mov64_bitrate	200000	Sets the target bitrate that the codec attempts to reach, within the limits set by the **Bitrate Tolerance** and **Quantizer Min/Max** controls.
Bitrate Tolerance	mov64_bitrate_ tolerance	4000000	Sets the amount that the bitrate can vary from the **Bitrate** 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	

Control (UI)	Knob (Scripting)	Default Value	Function
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
NotchLC Codec (Windows and Linux only)			
FPS	mov64_FPS	24	Sets the playback rate in frames per second for the output file.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color

Control (UI)	Knob (Scripting)	Default Value	Function
			range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.

Control (UI)	Knob (Scripting)	Default Value	Function
Motion JPEG B Codec			
Pixel Format	mov64_pixel_format	YCbCr 4:4:4 8-bit	Lists pixel formats supported by the current codec: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Quality	mov64_quality	High	Selects a preset level that automatically adjusts the **Advanced** controls. Higher values produce larger files with better quality. Select **Custom** to adjust the **Advanced** controls manually.
YCbCr Matrix	mov64_ycbcr_ matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
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	Sets the start time of any audio file specified in the **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Bitrate	mov64_bitrate	200000	Sets the target bitrate that the codec attempts to reach, within the limits set by the **Bitrate Tolerance** and **Quantizer Min/Max** controls.
Bitrate Tolerance	mov64_bitrate_ tolerance	4000000	Sets the amount that the bitrate can vary from the **Bitrate** 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	
Metadata Export			
Color Primaries	mov64_color_ primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_ function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
MPEG-4 Codec			
Pixel Format	mov64_pixel_format	YCbCr 4:2:0 8-bit	Lists pixel formats supported by the current codec:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Quality	mov64_quality	High	Selects a preset level that automatically adjusts the **Advanced** controls. Higher values produce larger files with better quality. Select **Custom** to adjust the **Advanced** controls manually.
YCbCr Matrix	mov64_ycbcr_ matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			specified in the **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.

Control (UI)	Knob (Scripting)	Default Value	Function
GOP Size	mov64_gop_size	12	Sets how many frames can be placed together to form a compression GOP (group of pictures). **Note:** Use caution with this control as large alterations can stop other applications reading the rendered file.
B Frames	mov64_b_frames	0	Sets the maximum number of B frames that can be consecutive in the rendered file. The default, 0, does not impose any maximum number of B frames in the output.
Limit Bitrate	mov64_limit_bitrate	disabled	When enabled, the maximum **Bitrate** is capped and the **Bitrate Tolerance** is set to 0. This control is designed to reduce output file size, but the render quality is generally lower.
Bitrate	mov64_bitrate	200000	Sets the target bitrate that the codec attempts to reach, within the limits set by the **Bitrate Tolerance** and **Quantizer Min/Max** controls.
Bitrate Tolerance	mov64_bitrate_ tolerance	4000000	Sets the amount that the bitrate can vary from the **Bitrate** 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	

Control (UI)	Knob (Scripting)	Default Value	Function
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
PHOTO JPEG Codec			
Pixel Format	mov64_pixel_format	YCbCr 4:4:4 8-bit	Lists pixel formats supported by the current codec: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
Quality	mov64_quality	High	Selects a preset level that automatically adjusts the **Advanced** controls. Higher values produce larger files with better quality. Select **Custom** to adjust the **Advanced** controls manually.
YCbCr	mov64_ycbcr_	Auto	Sets the way RGB is converted to Y'CbCr.

Control (UI)	Knob (Scripting)	Default Value	Function
Matrix	matrix_type		**Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-

Control (UI)	Knob (Scripting)	Default Value	Function
			bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Bitrate	mov64_bitrate	200000	Sets the target bitrate that the codec attempts to reach, within the limits set by the **Bitrate Tolerance** and **Quantizer Min/Max** controls.
Bitrate Tolerance	mov64_bitrate_ tolerance	4000000	Sets the amount that the bitrate can vary from the **Bitrate** 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	Quantizer Max
Metadata Export			
Color Primaries	mov64_color_ primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the

Control (UI)	Knob (Scripting)	Default Value	Function
			XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.
PNG Codec			
Pixel Format	mov64_pixel_format	RGB 16-bit	Lists pixel formats supported by the current codec: • **Pixel bit-depth** - 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.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**

Control (UI)	Knob (Scripting)	Default Value	Function
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto -

Control (UI)	Knob (Scripting)	Default Value	Function
			Uses legacy colorspace assignment based on content resolution.
Uncompressed Codec			
Pixel Format	mov64_pixel_format	YCbCr 4:2:2 10-bit	Lists pixel formats supported by the current codec: • **Pixel layout** - 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. • **Pixel bit-depth** - 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.
YCbCr Matrix	mov64_ycbcr_ matrix_type	Auto	Sets the way RGB is converted to Y'CbCr. **Rec 601** and **Rec 709** follow the ITU.BC specifications. **Auto** uses a set a heuristics to determine the best color matrix to use, including **Format-based**, which sets the color matrix to **Rec 601** for formats with a width below 840 pixels and **Rec 709** for formats with a width of 840 pixels or above. **Rec 2020** should be used for HDR.
Audio File	mov64_audiofile	N/A	Allows you to specify a separate audio file to include in the output. 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 **Audio File** control. The unit

Control (UI)	Knob (Scripting)	Default Value	Function
			of measure is specified using the **Units** control. Negative values cause the audio to start before the video and vice versa.
Units	mov64_units	Seconds	Sets the unit of measure for the **audio offset** control: • **Seconds** • **Frames**
Advanced			
Data Range	dataRange	Video Range	Sets the minimum and maximum color range values for encoding DNx files: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).
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 **.mov** file. 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. **Note:** The **input/timecode** key must be present in the sequence metadata in order to write a time code.

Control (UI)	Knob (Scripting)	Default Value	Function
Metadata Export			
Color Primaries	mov64_color_primaries	Auto (Use Legacy Assignment)	Specifies the color primaries metadata to be written to the MOV file. This defines the XYZ coordinates of the RGB primaries and white point. Auto - Uses legacy colorspace assignment based on content resolution.
Transfer Function	mov64_transfer_function	Auto (Use Legacy Assignment)	Specifies the transfer function (gamma) metadata to be written to the MOV file. This describes how RGB values are converted to and from linear light. Auto - Uses legacy colorspace assignment based on content resolution.

MXF

Control (UI)	Knob (Scripting)	Default Value	Function
Codec	mxf_video_codec_knob	Avid DNxHR	Sets the codec to use during rendering.
Pattern	mxf_op_pattern_knob	OP-1a	Sets the operational pattern of the rendered file: • **OP-1a** - combines video into a single file, similar to Final Cut Pro X. • **OP-Atom** - writes one video file, but the name will have _v1 at the end of the name, similar to Avid Media Composer.
FPS	mxf_edit_rate_knob	dependent on Compositing environment **Project Settings**	Sets the playback frames per second for the output file.
Codec Profile	mxf_codec_profile_knob	4:4:4 12-bit	Lists codec profiles supported by the current codec: • **Pixel layout** - 420, 422, 444, and so on. This defines

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Pixel bit-depth** - 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.
Tape ID	mxf_tape_id_knob	N/A	When **Pattern** is set to **OP-Atom**, 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: • **Full Range** - encodes with the full data range (0-255 for 8-bit or 0-1023 for 10-bit). • **Video Range** - encodes with a reduced, or video/legal, data range (16-240 for 8-bit or 64-960 for 10-bit).

PNG

Control (UI)	Knob (Scripting)	Default Value	Function
data type	datatype	8 bit	Sets the bit depth of the rendered **.png** files: • 8-bit • 16-bit

SGI

Control (UI)	Knob (Scripting)	Default Value	Function
data type	datatype	8 bit	Sets the bit depth of the rendered **.sgi** files: • 8-bit • 16-bit
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 **.tiff** files: • 8-bit • 16-bit • 32-bit float
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	An optional image to use as a mask. By default, the dither effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Dither Tab			
channels	channels	all	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **seed** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	The clone source can be on the same frame (value 0) or on another frame determined by the frame offset. **Note:** Frame offset is the same to all dust points on a particular frame (but frame offset can be animated over time if desired).
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 **none**.
	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	Sets the center position of the flare on the x and y axes. You can reposition the flare along an imaginary line between **position** and the center of the image using the **offset** control. In this case, set **position** to the coordinates of the light source.
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 **position**, or light source, at 1.
radius	radius	80, 100, 120	Sets the size of the flare as described by three radii: • **inner** - sets the size of the 'hole' filled by the **inner color** control. • **middle** - sets the thickness of the donut filled by the **ring color** control. • **outer** - sets the outer limit of the donut.
size mult	size_mult	1	Scales the flare globally, while retaining the ratio described by the **radius** 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 **outer** radius to the ring color on the **middle** radius.
inner color	inner_color	0.5	Sets the inner color of the flare donut. Flares fade from the ring color on the **middle** radius to the inner color on the **inner** 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	Moves chroma spread to and from the center of the flare. Positive values shift red outward and blue inward, and vice versa. **Note:** You can use the color **inner** and **outerfalloff** controls to compensate for banding created by large **chroma spread** values.

Control (UI)	Knob (Scripting)	Default Value	Function
chroma shift	chroma_shift	0	Moves color components in the direction specified in the **angle** control.
angle	chroma_shift_angle	0	Sets the direction of **chroma shift**. Positive values rotate the shift counter-clockwise and vice versa.
rel	chroma_shift_angle_add	disabled	When enabled, **angle** is relative to the light angle (the angle between **position** and the center point of the image).
Visibility			
brightness	brightness	1	Adjusts the overall brightness of the flare. 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 **none**.
	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. Where the visibility mask is white, the full **brightness** value is used. Where the mask is black, **brightness** 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 **edge flattening** 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 **edgeflattening**.
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, **angle** is relative to the light angle (the angle between **position** 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 **overall seed** 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 **position**.
	mult_offset_ seed	48235	Randomly varies the offsets for all repeat flares. You can tie **Multiple Flare** controls together by giving them the same value here.
size	mult_size	0	Randomly varies the sizes of all repeat flares. Positive values scale the flares down and vice versa.
	mult_size_ seed	94335	Randomly varies the sizes of all repeat flares. You can tie **Multiple Flare** controls together by giving them the same value here.
hue	mult_color	0	Randomly varies the colors of all repeat flares. 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 **Multiple Flare** controls together by giving them the same value here.
brightness	mult_ brightness	0	Randomly varies the brightness for all repeat flares. Positive values increase the flare brightness and vice versa.
	mult_ brightness_ seed	75021	Randomly varies the brightness for all repeat flares. You can tie **Multiple Flare** controls together by giving them the same value here.
visibility	mult_visibility	0	Randomly varies the visibility for all repeat flares. Positive values increase the flare opacity and vice versa.
	mult_visibility_ seed	68995	Randomly varies the visibility for all repeat flares. You can tie **Multiple Flare** 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. 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 **Multiple Flare** controls together by giving them the same value here.
rotation	mult_rotate	0	Randomly varies the rotation for all repeat flares. Positive values rotate the flare clockwise and vice versa.
	mult_rotate_ seed	49429	Randomly varies the rotation for all repeat flares. You can tie **Multiple Flare** 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 **position**.
Rings			
LgRainbow	LgRainbow	N/A	Creates multiple rainbow colored ring flares along the line from the image center to **position**.
Glowballs			
Bright	Bright	N/A	Creates multiple preset bright flares along the line from the image center to **position**.

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 **position**.
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	An optional image to use as a mask. By default, the star-shaped rays are limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Glint Tab			
channels	channels	all	The star-shaped rays are only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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	When enabled, the brightest image forming the rays is used. When disabled, the images forming the rays are added up.
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 **w** channel to the right.

Control (UI)	Knob (Scripting)	Default Value	Function
			Disabling this checkbox is the same as setting the channel to **none**.
	w_channel	none	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. This is different from the **mask** 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.
tolerance	tolerance	0.5	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. Low values produce more glint than high values.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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. If you require an identical grain plate for every frame, enter **-frame** in this field.
presets	presets	N/A	Choose the film stock you want to match: • Kodak 5248 • Kodak 5279 • Kodak FX214 • Kodak GT5274 • Kodak 5217 • Kodak 5218 • other - changes the label on the node to other. This has no effect on the effect applied.
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	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. When disabled, effect is applied to the entire image.
Invert alpha	invert_mask	disabled	Inverts the use of the alpha channel, so that when **Apply only through alpha** 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	An optional image to use as a mask. By default, the grid 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 **mask** control is disabled or set to **none**.

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

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 **replace** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	Selects whether to create a color gradient across the grid: • **none** - don't create a color gradient. • **linear** - the ramp changes linearly from one color into another. • **smooth0** - 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. • **smooth1** - 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. • **smooth** - 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.
color	color	1	Sets a color for the grid. If **ramp** is set to anything other than **none**, this is the color for the ramp at the point 1 end (by default, the top end).
point 1	p1	100, 400	Sets the position of point 1. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
color 0	color0	0	Sets the color for the ramp at the point 0 end (by default, the bottom end). This control is only available if **ramp** is set to anything other than **none**.
point 0	p0	100, 100	Sets the position of point 0. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.

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 **Intensity** need to be balanced out together. You may want to start by bringing **Diffuse** all the way down to better see what you are blending in from the background. Then, adjust **Intensity** before going back to the **Diffuse** slider and, if necessary, **Intensity** again until you are happy with the result.
Intensity	Intensity	0	Adjusts the brightness of the reflections on the foreground element. This and **Diffuse** need to be balanced out together. You may want to start by bringing **Diffuse** all the way down to better see what

Control (UI)	Knob (Scripting)	Default Value	Function
			you are blending in from the background. Then, adjust **Intensity** before going back to the **Diffuse** slider and, if necessary, **Intensity** 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, **plus**, 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 **Constant** control.
Constant	color	1	Sets the color to use in the LightWrap effect when **Use constant highlight** is enabled.
CCorrect Tab			
white	white	1	This color remains unchanged when you adjust **gamma**.

Control (UI)	Knob (Scripting)	Default Value	Function
midtone bias	gray	0.18	Sets the center of midtones, remaining unchanged when you adjust **contrast**.
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 Roto or RotoPaint.

Control (UI)	Knob (Scripting)	Default Value	Function
MarkerRemoval Tab			
paint type	mode	bilinear	Sets the paint mode used to fill the roto shape(s): • **bilinear** - extrapolates pixels on the xy axes to fill the roto shape(s). • **radial** - extrapolates pixels radially outward from a center point to fill the roto shape(s).

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The center point is averaged between the number of roto shapes, so **radial** painting with more than one roto shape is not recommended. When using the **radial** mode, you should only use one roto shape for each MarkerRemoval node.
bilinear y search	linearsearch	100	Sets the height (in pixels) used to search for suitable pixels to fill the roto shape. 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. **Note:** This option is only available when the **painttype** is set to **bilinear**.
control channel		enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**, 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 **left** or **right** 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 **top** or **bottom** 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	An optional image to use as a mask. By default, the noise 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Noise Tab			
output	output	rgba	The noise is rendered into these output channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
premult	premult	none	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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting **rgba** premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premult** to **rgb** instead.
clip to	cliptype	format	Select how to restrict the output image: • **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **unionbboxandformat** - restrict the output image to a combination of the incoming bounding box and format area. • **intersectbboxandformat** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** 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 **none**.
	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 **mask** input to the predefined **mask.a**

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: • **fBm** (fractional Brownian motion) - runs noise() octave times at different scales to get random numbers between -1 and +1 and adds them up. • **turbulence** - similar to **fBm** except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1.
x/ysize	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 *frame/10* 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. **Note:** You may need to disable this control if you're animating the size of the noise, as changes can be visible.
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 **center x y** 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 **center x y** 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	Selects whether to create a color gradient across the noise: • **none** - don't create a color gradient. • **linear** - the ramp changes linearly from one color into another. • **smooth0** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **smooth1** - 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. • **smooth** - 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.
color	color	1	Sets a color for the noise. If **ramp** is set to anything other than **none**, this is the color for the ramp at the point 1 end (by default, the top end).
point 1	p1	100, 400	Sets the position of point 1. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
color 0	color0	0	Sets the color for the ramp at the point 0 end (by default, the bottom end). This control is only available if **ramp** is set to anything other than **none**.
point 0	p0	100, 100	Sets the position of point 0. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.

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	An optional image to use as a mask. By default, the effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Radial Tab			
output	output	rgba	The effect is rendered into these output channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
premult	premult	none	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. **Note:** Selecting **rgba** premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premult** to **rgb** instead.
clip to	cliptype	format	Select how to restrict the output image: • **no clip** - use the entire image.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **unionbboxandformat** - restrict the output image to a combination of the incoming bounding box and format area. • **intersectbboxandformat** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **area** 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	Selects whether to create a color gradient across the radial ramp: • **none** - don't create a color gradient. • **linear** - the ramp changes linearly from one color into another. • **smooth0** - 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. • **smooth1** - 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. • **smooth** - 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.
color	color	1	Sets a color for the ramp. If **ramp** is set to anything other than **none**, this is the color for the ramp at the point 1 end (by default, the top end).
point 1 xy	p1	100, 400	Sets the position of point 1. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
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). This control is only available if **ramp** is set to anything other than **none**.
point 0 xy	p0	100, 100	Sets the position of point 0. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.

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. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Ramp Tab			
output	output	rgba	The ramp is rendered into these output channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
premult	premult	none	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. **Note:** Selecting **rgba** premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premult** to **rgb** instead.
clip to	cliptype	format	Select how to restrict the output image: • **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **union bbox+format** - restrict the output image to a combination of the incoming bounding box and format area. • **intersect bbox+format** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** useful, for instance, if you're creating a mask in the alpha channel, but the incoming image already has an

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 **none**.
	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 **mask** input to the predefined **mask.a** 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	Sets the position of point 0. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
point 1 xy	p1	100, 400	Sets the position of point 1. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
type	type	linear	Sets the type of ramp to apply: • **linear** - the ramp has a linear gradient. • **plinear** - the ramp appears to have more linear gradient to the naked eye. • **smooth0** - the ramp gradually eases into the point

Control (UI)	Knob (Scripting)	Default Value	Function
			0 end. • **smooth1** - the ramp eases into the point 1 end. • **smooth** - 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. 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
output	output	rgba	The rectangle is rendered into these output channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
premult	premult	none	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. **Note:** Selecting **rgba** premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premult** to **rgb** instead.
clip to	cliptype	format	Select how to restrict the output image: • **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **unionbboxandformat** - restrict the output image to a combination of the incoming bounding box and format area. • **intersectbboxandformat** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** 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.

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 **none**.
	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 **mask** input to the predefined **mask.a** 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	Selects whether to create a color gradient across the rectangle: • **none** - don't create a color gradient. • **linear** - the ramp changes linearly from one color into another. • **smooth0** - 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. • **smooth1** - the ramp color eases into the point 1 end. This means colors in the point 1 end are spread

Control (UI)	Knob (Scripting)	Default Value	Function
			wider than colors in the point 0 end. • **smooth** - 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.
color	color	1	Sets a color for the ramp. If **ramp** is set to anything other than **none**, this is the color for the ramp at the point 1 end (by default, the top end).
point 1 xy	p1	100, 400	Sets the position of point 1. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.
color 0	color0	0	Sets the color for the ramp at the point 0 end (by default, the bottom end). This control is only available if **ramp** is set to anything other than **none**.
point 0 xy	p0	100, 100	Sets the position of point 0. This allows you to adjust the spread and angle of the ramp. This control is only available if **ramp** is set to anything other than **none**.

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 **bg** input, allowing you to connect up to four images.

Connection Type	Connection Name	Function
	mask	An optional image to use as a mask. By default, the roto shapes are limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Roto Tab			
output	output	alpha	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. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
premultiply	premultiply	none	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. **Note:** Selecting rgba premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premultiply** to **rgb** instead.
clip to	cliptype	format	Select how to restrict the output image:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **union bbox+format** - restrict the output image to a combination of the incoming bounding box and format area. • **intersect bbox+format** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** 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	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. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated on the **Project Settings** dialog box.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. 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 **none**.
	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. With positive feather values, your feather effect is outward. If your feather values are negative, the feather effect is inward. You can also add feathering to individual points by **Ctrl**/**Cmd**+dragging a point in the Viewer. Press **E** to increase the feathering of selected points, or **Shift**+**E** to remove the feathering. If you check **feather link** 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 **Ctrl**/**Cmd**+drag a shape

Control (UI)	Knob (Scripting)	Default Value	Function
			point to temporarily disable **feather link** and move the points independently.
on	feather_on	enabled	When enabled, feathering is applied to the selected shape(s). Disabling this is the same as setting **feather** to 0.
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	Controls the center point of the feather falloff: • **linear** - the falloff changes linearly from the shape edge to the feather edge. • **smooth0** - the center point of the feather falloff lies closer to the shape edge than the feather edge. • **smooth1** - the center point of the feather falloff lies closer to the feather edge than the shape edge. • **smooth** - the center point of the feather falloff lies halfway between the shape edge and the feather edge. These options may be helpful, for example, in matching the soft edge to motion blurred image content.
spline key	key	0	Quick access to spline keyframes: • **Numeric fields** - show whether the spline is keyed at this frame, which key you're viewing, and the total number of spline keys. • - move to the previous or next spline key.

Control (UI)	Knob (Scripting)	Default Value	Function
			• - set or delete spline keys.
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 x,y	stereo_offset	0	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 **Shift** while dragging to constrain the movement to x or y axis only. **Stereo offset** 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 **translate** control on the **Transform** tab because that's being driven by Tracker data. 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).
shape list	curves	N/A	Shows the hierarchy of shapes and groups, allowing

Control (UI)	Knob (Scripting)	Default Value	Function
			you to adjust them and how they're displayed in the Viewer: • **Name** - double-click to edit the shape or group Name. • - whether the shape or group is visible and rendered or not. • - lock or unlock the shape or group. • - set the shape outline color to appear in the Viewer. • - set the color in which you want to render your shape. • - invert the shape or group. • - set the shape or group blending mode. • - whether motion blur is applied to the shape. **Note:** You can only apply motion blur to shapes, not groups of shapes. • **View** - 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). • **Lifetime** - the range of frames during which the shape is visible. • **Source** - the shape source (as set on the **Shape** tab). Use the shape list to: • Select multiple items to adjust attributes on all the selected list items. • Drag and drop to re-order or move items between

Control (UI)	Knob (Scripting)	Default Value	Function
			groups. • Right-click for a context menu containing **Add new layer** and shape editing functions such as **Copy** and **Paste**.
Transform Tab			
translate x,y	translate	0	Moves the selected shape or group on the x and y axes. You can also adjust **translate** values by dragging the transform handle in the Viewer.
rotate	rotate	0	Spins the selected shape or group around a pivot point. Use **center x,y** to position the pivot point. You can also adjust **rotate** values by dragging the transform handle in the Viewer.
scale	scale	1	Resizes the selected shape or group on the x and y

Control (UI)	Knob (Scripting)	Default Value	Function
			axes. You can also adjust **scale** values by dragging the transform handle in the Viewer.
skew X	skewX	0	Skews the selected shape or group along the X axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **skew** values by dragging the transform handle in the Viewer.
skew Y	skewY		Skews the selected shape or group along the Y axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **skew** values by dragging the transform handle in the Viewer.
skew order	skew_order	XY	Sets the order in which **skew X** and **skew Y** are applied: • **XY** - **Skew X** is applied before **skew Y**. • **YX** - **Skew Y** is applied before **skew X**.
center x,y	center	1024, 778	Adjusts the center of rotation and skew on the x and y axes. This control does not translate roto shapes. You can also adjust **center** values by **Ctrl**/**Cmd**+**Shift** and dragging the transform handle in the Viewer.
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 list	curves	N/A	See the **Roto** tab for the shape list controls.

Control (UI)	Knob (Scripting)	Default Value	Function
Motion Blur Tab			
shape	global_motionblur_on	enabled	When enabled, motion blur is applied to shapes selected in the shape list or Viewer. **shape** motion blur determines the exposure for each moving shape and blends the resulting blurred shapes. This may be more efficient than the **global** motion blur since each shape will only be blended once. **Note:** Shape motion blur may result in artifacts when shapes blur over the same region.
global		disabled	When enabled, motion blur is applied to all shapes in the current Roto node. **Note:** Global motion blur overrides the per-shape motion blur settings. **global** motion blur correctly accounts for interaction between motion blurred shapes.This may be more expensive than the **shape** motion blur since it may blend each shape for every sample. **Note:** 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 **over** blend mode.
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: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
[offset]	motionblur_ shutter_offset	0	If the shutter offset control is set to **custom**, this control 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.
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	Controls how the shutter behaves with respect to the current frame value. There are four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			the current frame.
[offset]	global_motionblur_shutter_offset	0	If the shutter offset control is set to **custom**, this control 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.
shape list	curves	N/A	See the **Roto** tab for the shape list controls.
Shape Tab			
source	shape_source	color	Sets the color or source input for the selected shape: • **color** - the color specified in the **color** field. • **foreground** - 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. • **background** - pulls pixels from the bg input, not including any shapes drawn on it. • **backgrounds 1 to 3** - pulls pixels from **bg1**, **bg2**, and **bg3** inputs.
blending mode	blending_mode	over	Sets how the colors in the current shape (A) are merged with the underlying image and shapes (B): • **color-burn** (darken B towards A) - darkens B to reflect A by increasing the contrast. No part of the image becomes lighter. • **color-dodge** (brighten B towards A) - brightens B to reflect A by decreasing the contrast. No part of the image is darkened. • **difference** (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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **exclusion** (A+B-2AB) - creates a result similar to the **difference** mode but lower in contrast. Like with **difference**, blending with white inverts A. Blending with black produces no change. • **from** (B-A) - subtracts A from B. • **hard-light** (multiply if A<.5, screen if A>.5) - 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. • **max** (max(A,B)) - 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. • **min** (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.
blending mode (continued)			• **minus** (A-B) - subtracts B from A. • **multiply** (AB, A if A<0 and B<0) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged. • **over** (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. • **overlay** (multiply if B<.5, screen if B>.5) - depending on A, multiplies or screens the colors. B brightens A while preserving highlights and shadows. • **plus** (A+B) - the sum of the two colors. Increases brightness to lighten A and reflect B. Plus is similar to the **screen** blending mode, but produces a more extreme result.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **screen** (A+B-AB if A and B between 0-1, else A if A>B else B) - this is a soft **plus** 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. • **soft-light** - depending on A, darkens or lightens the colors. Less extreme than the **hard light** blending mode.
color	color	1	Sets the color for the roto shape. This control only has an effect when **source** is set to **color**.
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: • **rounded** - the starting point of the spline has a rounded end. • **square** - the starting point of the spline has a square end.
end type	openspline_last_end_type	rounded	Sets the style of the last point for the selected spline (s) and all new open splines: • **rounded** - the finishing point of the spline has a rounded end. • **square** - the finishing point of the spline has a square end.
invert	inverted	disabled	Swaps the colors of the currently selected shape and the underlying image.
shape list	curves	N/A	See the **Roto** tab for the shape list controls.
Clone Tab			

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

Control (UI)	Knob (Scripting)	Default Value	Function
skew Y	source_transform_skewY	0	Skews the source image along the Y axis from the pivot point. Use **center x,y** to position the pivot point. You can adjust **skew** values by dragging the transform handles in the Viewer. If **source** is set to **color** on the **Shape** tab, this control is disabled.
skew order	source_transform_skew_order	XY	Sets the order in which **skew X** and **skew Y** are applied: • **XY** - **skew X** is applied before **skew Y**. • **YX** - **skew Y** is applied before **skew X**.
center x,y	source_transform_center	N/A	Adjusts the center of rotation and skew on the x and y axes. This control does not translate the **source** image. You can also adjust **center** values by **Ctrl**/**Cmd**+**Shift** and dragging the transform handle in the Viewer. If **source** is set to **color** on the **Shape** tab, this control is disabled.
filter	source_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). **Note:** If **source** is set to **color** on the **Shape** tab, the **filter** dropdown is disabled.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
black outside	source_black_ outside	disabled	When rotating or translating the **source** image, a part of the image area may get cropped. To fill the cropped portion with black, check **black outside**. To fill the cropped portion by expanding the edges of the image, uncheck **black outside**. **Note:** If **source** is set to **color** on the **Shape** tab, this control is disabled.

Control (UI)	Knob (Scripting)	Default Value	Function
time offset	source_time_offset	0	Allows you to clone or reveal pixels from a different frame. Time offset is either **relative** to the current frame (-1 is the frame previous to the current one) or **absolute** (1 is the first frame in the clip). If **source** is set to **color** on the **Shape** tab, this control is disabled.
	source_time_offset_type	relative	
view	source_view	current	Sets the view you want to clone from. 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).
shape list	curves	N/A	See the **Roto** 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: • **all** - the selection appears in all frames of the composition. • **start to frame** - the selection appears from the first frame to the specified **to** frame. • **single** - the selection appears on one frame only. You can specify the frame using the **from** field. • **to end** - the selection appears from the specified **from** frame to the last frame. • **range** - the selection appears from the specified **from** frame up to the specified **to** frame.
from	lifetime_start	1	Sets the first frame for **single**, **to end**, and **range** lifetime types.
to	lifetime_end	1	Sets the last frame for **start to frame** and **range** lifetime types.
shape list	curves	N/A	See the **Roto** 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. 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: • **none** - This disables all pre-filtering, which allows you to have full control of tuning the input image for tracking. • **adjust contrast** - This stretches the image contrast to better suit the tracking algorithm. This option is recommended.
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. 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: • **CornerPin2D (relative)** - warp the image according to the relative transform between the current frame and the reference frame. • **CornerPin2D (absolute)** - set the to positions to the corners of the planar surface, and the from

Control (UI)	Knob (Scripting)	Default Value	Function
			positions to the dimensions of the currently selected node. This option places the incoming image entirely inside the planar surface. • **CornerPin2D (stabilize)** - 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. • **Tracker** - 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 Roto and the exported node, so that when the track updates, the points are updated too.
Correction			
CornerPin points			
point1 xy point2 xy point3 xy point4 xy	pt1 pt2 pt3 pt4	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.
Offsets			
offset1 xy offset2 xy offset3 xy	of1 of2 of3	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.

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 **Roto** 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 **bg** input allowing you to connect up to four images.
	mask	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. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
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
			this node - you cannot create a subset of shapes or strokes and output them to a different channel. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
premultiply	premultiply	none	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. Note that selecting **rgba** premultiplies the alpha against itself (a*a). If you don't want this to happen, set **premultiply** to **rgb**.
clip to	cliptype	format	Sets how to restrict the output image: • **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **union bbox and format** - restrict the output image to a combination of the incoming bounding box and format area. • **intersect bbox and format** - restrict the output image to an intersection of the bounding box and incoming format area.
replace	replace	disabled	When enabled, existing channels are cleared to black before drawing into them. You might find **replace** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			away.
format dropdown			
format	format	root.format	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. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated on the **Project Settings** dialog box.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. When disabled, the effect is applied to the entire mask.
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 **none**.
	outputMask	none	Output mask channel. This is a channel where

Control (UI)	Knob (Scripting)	Default Value	Function
			RotoPaint will output a mask for what it rendered. 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.
color	color	1	Sets the color for the roto shape or paint stroke. This control only has an effect when **source** is set to **color** on the **Shape** or **Stroke** 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	Sets the source color for the selected shape/stroke: • **color** - the color specified in the **color** field. • **foreground** - pulls pixels from the **bg** input, including any shapes and strokes drawn on it. This input is mainly used with the **Clone** tab controls. Using it may cause slower renders. • **background** - pulls pixels from the **bg** input, not including any shapes and strokes drawn on it. • **backgrounds 1 to 3** - pulls pixels from **bg1**, **bg2**, and **bg3** inputs.
blending mode	blending_mode	over	Sets how the colors in the current shape (A) are merged with the underlying image and shapes (B): • **color-burn** (darken B towards A) - darkens B to reflect A by increasing the contrast. No part of the image becomes lighter. • **color-dodge** (brighten B towards A) - brightens B to reflect A by decreasing the contrast. No part of the image is darkened. • **difference** (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

Control (UI)	Knob (Scripting)	Default Value	Function
			return black pixels. • **exclusion** (A+B-2AB) - creates a result similar to the **difference** mode but lower in contrast. Like with **difference**, blending with white inverts A. Blending with black produces no change. • **from** (B-A) - subtracts A from B. • **hard-light** (multiply if A<.5, screen if A>.5) - 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. • **max** (max(A,B)) - 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. • **min** (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.
blending mode (continued)			• **minus** (A-B) - subtracts B from A. • **multiply** (AB, A if A<0 and B<0) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged. • **over** (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. • **overlay** (multiply if B<.5, screen if B>.5) - depending on A, multiplies or screens the colors. B brightens A while preserving highlights and shadows. • **plus** (A+B) - the sum of the two colors. Increases brightness to lighten A and reflect B. Plus is similar to the **screen** blending mode, but produces a

Control (UI)	Knob (Scripting)	Default Value	Function
			more extreme result. • **screen** (A+B-AB if A and B between 0-1, else A if A>B else B) - this is a soft **plus** 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. • **soft-light** - depending on A, darkens or lightens the colors. Less extreme than the **hard light** blending mode.
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 **Project Settings** (typically, if you're working on a stereoscopic project).
spline key	key	0	Quick access to spline keyframes: • **Numeric fields** - show whether the spline is keyed at this frame, which key you're viewing, and the total number of spline keys. • - move to the previous or next spline key. • - set or delete spline keys.
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
			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 **Shift** while dragging to constrain the movement to x or y axis only. **Stereo offset** 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 **translate** control on the **Transform** tab because that's being driven by Tracker data. 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).
shape/stroke list	curves	N/A	Shows the hierarchy of shapes, paint strokes, and groups, allowing you to adjust them and how they're displayed in the Viewer: • **Name** - double-click to edit the shape, stroke, or group Name. • - whether the shape, stroke, or group is visible and rendered. • - lock or unlock the shape, stroke, or group. • - set the shape outline color to appear in the Viewer. • - set the color in which you want to render your shape/stroke. • - invert the shape, stroke, or group. • - set the shape, stroke, or group blending mode. • - whether motion blur is applied to the shape.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **View** - displays the view(s) the shape/stroke appears in. This is only displayed if you have set up more than one view in your **Projects Settings** (typically, if you're working on a stereoscopic project). • **Lifetime** - the range of frames during which the shape/stroke is visible. • **Source** - the shape or stroke source (as set on the **Shape**, **Stroke**, or **RotoPaint** tab). Use the shape/stroke list to: • Select multiple items to adjust attributes on all the selected list items. • Drag and drop to re-order or move items between groups. • Right-click for a context menu containing **Add new layer** and shape/stroke editing functions such as **Copy** and **Paste**.
Transform Tab			
translate x,y	translate	0	Moves the selected shape, stroke, or group on the x and y axes. You can also adjust **tranlate** values by dragging the transform handle in the Viewer.
rotate	rotate	0	Spins the selected shape, stroke, or group around the pivot point. Use **center x,y** to position the pivot point. You can also adjust **rotate** values by dragging the

Control (UI)	Knob (Scripting)	Default Value	Function
			transform handle in the Viewer.
scale	scale	1	Resizes the selected shape, stroke, or group on the x and y axes. You can also adjust **scale** values by dragging the transform handle in the Viewer.
skew X	skewX	0	Skews the selected shape, stroke, or group along the X axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **center** values by **Ctrl/Cmd**+**Shift** and dragging the transform handle in the Viewer.
skew Y	skewY	0	Skews the selected shape, stroke, or group along the Y axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **center** values by **Ctrl/Cmd**+**Shift** and dragging the transform handle in the Viewer.
skew order	skew_order	XY	Sets the order in which **skew X** and **skew Y** are applied: • **XY** - **Skew X** is applied before **skew Y**. • **YX** - **Skew Y** is applied before **skew X**.
center x,y	center	1024, 778	Adjusts the center of rotation and skew on the X and Y axes. This control does not translate shapes or strokes. You can also adjust **center** values by **Ctrl/Cmd**+**Shift** and dragging the transform handle in the Viewer.

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 **RotoPaint** tab for the shape list controls.
Motion Blur Tab			
shape	global_motionblur_on	enabled	When enabled, motion blur is applied to shapes selected in the shape list or Viewer. **shape** motion blur determines the exposure for each moving shape and blends the resulting blurred shape. This may be more efficient than the **global** motion blur since each shape will only be blended once. **Note:** Shape motion blur may result in artifacts when shapes blur over the same region.
global		disabled	When enabled, motion blur is applied to all shapes in the current RotoPaint node. **Note:** Global motion blur overrides the per-shape motion blur settings. **global** motion blur correctly accounts for interaction between motion blurred shapes.This may be more expensive than the **shape** motion blur since it may blend each shape for every sample.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **over** 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	Controls how the shutter behaves with respect to the current frame value. There are four options: • **centred** - 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. • **start** - 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. • **end** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **custom** - 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.
[offset]	motionblur_ shutter_offset	0	If the shutter offset control is set to **custom**, this control 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.
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	Controls how the shutter behaves with respect to the current frame value. There are four options: • **centred** - 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. • **start** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **end** - 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. • **custom** - 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.
[offset]	global_motionblur_shutter_offset	0	If the shutter offset control is set to **custom**, this control 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.
shape/stroke list	curves	N/A	See the **RotoPaint** tab for the shape list controls.
Shape Tab			
source	shape_source	color	Sets the color or source input for the selected shape: • **color** - the color specified in the **color** field. • **foreground** - 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. • **background** - pulls pixels from the **bg** input, not including any shapes drawn on it. • **backgrounds 1 to 3** - pulls pixels from **bg1**, **bg2**, and **bg3** inputs.
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
			With positive feather values, your feather effect is outward. If your feather values are negative, the feather effect is inward. You can also add feathering to individual points by **Ctrl/Cmd**+dragging a point in the Viewer. Press **E** to increase the feathering of selected points, or **Shift**+**E** to remove the feathering. If you check **feather link** 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 **Ctrl/Cmd**+drag a shape point to temporarily disable **feather link** and move the points independently.
on	feather_on	enabled	When enabled, feathering is applied to the selected shape(s). Disabling this is the same as setting **feather** to 0.
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	Controls the center point of the feather falloff: • **linear** - the falloff changes linearly from the shape edge to the feather edge. • **smooth0** - the center point of the feather falloff lies closer to the shape edge than the feather edge. • **smooth1** - the center point of the feather falloff lies closer to the feather edge than the shape edge. • **smooth** - the center point of the feather falloff lies halfway between the shape edge and the feather edge. These options may be helpful, for example, in

Control (UI)	Knob (Scripting)	Default Value	Function
			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: • **rounded** - the starting point of the spline has a rounded end. • **square** - the starting point of the spline has a square end.
end type	openspline_last_end_type	rounded	Sets the style of the last point for the selected spline (s) and all new open splines: • **rounded** - the finishing point of the spline has a rounded end. • **square** - the finishing point of the spline has a square end.
invert	inverted	disabled	Swaps the colors of the currently selected shape and the underlying image.
shape/stroke list	curves	N/A	See the **RotoPaint** tab for the shape list controls.
Stroke Tab			
source	brush_source	color	Sets the color or source input for the selected stroke: • **color** - the color specified in the **color** field. • **foreground** - pulls pixels from the **bg** input,

Control (UI)	Knob (Scripting)	Default Value	Function
			including any shapes and strokes drawn on it. This input is mainly used with the **Clone** tab controls. Using it may cause slower renders. • **background** - pulls pixels from the **bg** input, not including any shapes or strokes drawn on it. • **backgrounds 1 to 3** - pulls pixels from **bg1**, **bg2**, and **bg3** inputs.
brush type	brush_type	paint	Brush types selected from the control panel only affect existing strokes. Use the Viewer tools to create new strokes. Specify the brush type for the selected stroke: • **paint** - applies colored or blended paint strokes. • **smear** - pulls the pixels under the cursor in the direction of the paint stroke. • **blur** - blurs the area under the paint stroke. You can adjust the blur amount using the **effect** control. • **sharpen** - sharpens the area under the paint stroke by increasing contrast. You can adjust the sharpening using the **effect** control.
brush size	brush_size	25	Sets the brush stroke diameter in pixels. Alternatively, you can **Shift**+drag in the Viewer to set the brush size.
brush spacing	brush_spacing	0.05	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.
brush hardness	brush_hardness	0.2	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.

Control (UI)	Knob (Scripting)	Default Value	Function
			You can also tie a stroke's hardness to pen pressure by checking **hardness** next to **pressure alters**.
effect	effect_parameter1	0	Controls the strength of blur and sharpen brush strokes. **Paint** and **smear** 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 write on end	writeon_start writeon_end	0 1	When animating strokes, sets the order in which the dabs on a stroke appear over a number of frames. • **write on start** - set where along the stroke length the paint begins. 0 is the start of the stroke, 1 is the end. • **write on end** - set where along the stroke length the paint ends.
shape/stroke list	curves	N/A	See the **RotoPaint** tab for the shape list controls.
Clone Tab			
translate x,y	source_transform_ translate	0,0	Moves the **source** image along the x and y axes. You can also adjust **translate** values by dragging the transform handles in the Viewer. If **source** is set to **color**, this control is disabled.
rotate	source_transform_	0	Spins the **source** image around the pivot point. Use

Control (UI)	Knob (Scripting)	Default Value	Function
	rotate		**center x,y** to position the pivot point. You can also adjust **rotate** values by dragging the transform handles in the Viewer. If **source** is set to **color**, this control is disabled.
scale	source_transform_scale	1	Resizes the **source** image on the x and y axes. You can also adjust **scale** values by dragging the transform handles in the Viewer. If **source** is set to **color**, this control is disabled.
skew X	source_transform_skewX	0	Skews the **source** along the X axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **skew** values by dragging the transform handles in the Viewer. If **source** is set to **color**, this control is disabled.
skew Y	source_transform_skewY	0	Skews the **source** along the Y axis from the pivot point. Use **center x,y** to position the pivot point. You can also adjust **skew** values by dragging the transform handles in the Viewer. If **source** is set to **color**, this control is disabled.
skew order	skew_order	XY	Sets the order in which **skew X** and **skew Y** are applied: • **XY** - **Skew X** is applied before **skew Y**. • **YX** - **Skew Y** is applied before **skew X**.
center x,y	source_transform_center	N/A	Adjusts the center of rotation and skew on the x and y axes. This control does not translate the **source** image. You can also adjust **center** values by **Ctrl**/**Cmd**+**Shift** and dragging the transform handle

Control (UI)	Knob (Scripting)	Default Value	Function
			in the Viewer. If **source** is set to **color**, this control is disabled.
round to pixel	source_translate_ round	disabled	Rounds the **translate x,y** amount to the nearest whole integer pixel. This can help you avoid softening when using filtering. If **source** is set to **color**, this control is disabled.
filter	source_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). **Note:** If **source** is set to **color** on the **Shape** tab, the **filter** dropdown is disabled. • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown

Control (UI)	Knob (Scripting)	Default Value	Function
			by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
black outside	source_black_outside	disabled	When rotating or translating the **source** image, a part of the image area may get cropped. To fill the cropped portion with black, check **black outside**. To fill the cropped portion by expanding the edges of the image, uncheck **black outside**. If **source** is set to **color**, this control is disabled.
time offset	source_time_offset	0	Allows you to clone or reveal pixels from a different frame. Time offset is either **relative** to the current frame (-1 is the frame previous to the current one) or **absolute** (1 is the first frame in the clip). **Note:** If **source** is set to **color** on the **Shape** tab, this control is disabled.
	source_time_offset_type	relative	
view	source_view	current	Sets the view used as the clone source. To use the view currently displayed in the Viewer, select **current**. 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).
shape/stroke	curves	N/A	See the **RotoPaint** tab for the shape list controls.

Control (UI)	Knob (Scripting)	Default Value	Function
list			
Lifetime Tab			
lifetime type	lifetime_type	single frame	Sets the range of frames during which the currently selected shape, stroke or group is visible: • **all** - the selection appears in all frames of the composition. • **start to frame** - the selection appears from the first frame to the specified to frame. • **single frame** - the selection appears on one frame only. You can specify the frame in the **from** control. • **to end** - the selection appears from the specified **from** frame to the last frame. • **range** - the selection appears from the specified **from** frame up to the specified to frame.
from	lifetime_start	1	Sets the first frame for **single**, **to end**, and **range** lifetime types.
to	lifetime_end	1	Sets the last frame for **start to frame** and **range** lifetime types.
shape/stroke list	curves	N/A	See the **RotoPaint** tab for the shape list controls.

Control (UI)	Knob (Scripting)	Default Value	Function
Tracking Tab			
Settings			
track channels	channels	rgb	The color correction is only applied to these channels. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			applied. You can select one of the following options: **none** - This disables all pre-filtering, which allows you to have full control of tuning the input image for tracking. **adjust contrast** - This stretches the image contrast to better suit the tracking algorithm. This option is recommended.
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. 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: **CornerPin2D (relative)** - warp the image according to the relative transform between the current frame and the reference frame. **CornerPin2D (absolute)** - 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. **CornerPin2D (stabilize)** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			corrections. **Tracker** - 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 point2 xy point3 xy point4 xy	pt1 pt2 pt3 pt4	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.
Offsets			
offset1 xy offset2 xy offset3 xy offset4 xy	of1 of2 of3 of4	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.
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 **Roto** 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	An optional image to use as a mask. By default, the grain is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ScannedGrain Tab			
grain	fullGrain	[file dir $program_ name]/FilmGrain/	Sets the file path of your scanned grain images. To create the film grain images: 1. Film a gray card and scan the result to file. 2. Blur the scanned image. 3. Subtract the blurred image from the original. 4. Add 0.5 to the rgb channels.

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	Sets the minimum width (in pixels) that images must have in order for grain to be applied. Set a minimum width to ensure that the grain resolution matches the image otherwise you may get unwanted results.
resize	resize	enabled	When enabled, resizes the **grain** plate to match your input. When disabled, the grain plate is cropped to match.
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	When enabled, the output LUT is clamped between 0 and 1. This control is enabled by default for backward compatibility. When disabled, Nuke does not clamp the LUT.
curve editor	weight	N/A	The **grain** 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	Sets the low threshold based on the input image. 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.
seed	seed	1	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 **ScannedGrain** nodes. If you require an identical grain plate for every frame, enter **-frame** in this field.

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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images,

Control (UI)	Knob (Scripting)	Default Value	Function
			you should leave this set to **none**.
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 **position** indicator in the Viewer: • **Rays** - produces rays fading away from the origin. • **Sparkles** - produces intermittent rays fading at either end of each ray.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Fireworks** - produces rays fading toward the origin.
triangle shapes	triangle_think	disabled	When enabled, a triangle shape it 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. **Note:** When **Sparkle type** is set to **Sparkles**, this control determines the size of the longest ray.
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 **Sparkel type** is set to **Sparkles**, 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. **Note:** This control behaves differently depending on the **Sparkle type** selected. For example, **Fireworks** 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 **none**.
	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 **mask** is set to anything other than **none**.
Effects Tab			
Sparkle crawl - These controls do not affect **Rays**.			

Control (UI)	Knob (Scripting)	Default Value	Function
Sparkle crawl	sparkle_crawl	disabled	When enabled, use the **Sparkle crawl** controls to cause **Sparkles** or **Fireworks** to move, or crawl.
motion	motion	300	Sets the amount of motion to apply. Animating this control causes **Sparkles** or **Fireworks** 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 **Sparkles** only.
Broken rays			
Broken rays	broken_rays	disabled	When enabled, use the **Broken rays** 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 **break start** control is randomized.
breaks	broken_holes	0.2	Sets the number of breaks per ray after the **break start**.
random	random_ broken_holes	disabled	When enabled, the **breaks** control is randomized.
Sparks			
sparks (direction clip)	sparks	disabled	When enabled, use the **Sparks** 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	An optional image to use as a mask. By default, the text is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Text Tab			
output	output	rgba	The text only appears in these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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	Select how to restrict the output image: • **no clip** - use the entire image. • **bbox** - restrict the output image to the incoming bounding box. • **format** - restrict the output image to the incoming format area. • **union bbox+format** - restrict the output image to the combination of the incoming bounding box and format area. • **intersect bbox+format** - restrict the output image to the intersection of the incoming bounding box and format area.
replace	replace	disabled	When enabled, the affected channels are cleared to black before drawing on them. When disabled, the text is drawn on top of the input image.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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, **[date]**. To begin a new line, press **Return**. To display special Unicode characters, such as foreign language characters and copyright signs, you can: • use HTML named entities, such as **©** to display © • use hex entities, such as **©** to display © • use decimal entities, such as **©** to display © • 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. The above only work if the font you are using has the character you want to display in it. **Note:** We recommend using the above entities rather than typing **<**, 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. See *Creating Text Overlays* in the *Nuke User Guide,*

Control (UI)	Knob (Scripting)	Default Value	Function
			for examples of Tcl expressions, Tcl variables, HMTL named entities, hex entities, and decimal entities you can use in the Text node. **Tip:** To get a list of all the Tcl expressions you can use with **date**, you can also type **X** on the Node Graph, set the script command dialog that opens to **Tcl**, enter **date -h**, and click **OK**.
box xyrt (or xywh)	box	N/A	Adjusts the on-screen box that limits the text inside a certain area of the frame: • To define the left boundary of the box, adjust the **x** field. • To define the bottom boundary of the box, adjust the **y** field. • To define the right/width boundary of the box, adjust the **r** field. • To define the top/height boundary of the box, adjust the **t** field. You can also move and resize the box in the Viewer. Your text is wrapped inside the box you defined.
justify	xjustify	left	Sets how to align the text horizontally: • **left** - align the text along the left edge of the on-screen text box. This leaves the right edge of the text ragged. • **center** - align the text from the center of the on-screen text box. This leaves both edges of the text ragged. • **right** - align the text along the right edge of the on-screen text box. This leaves the left edge of

Control (UI)	Knob (Scripting)	Default Value	Function
			the text ragged. • **justify** - 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.
	yjustify	top	Sets how to align the text vertically: • **top** - align the text against the top edge of the on-screen text box. • **center** - align the text from the center of the on-screen text box. • **bottom** - align the text against the bottom edge of the on-screen text box.
font	font	Utopia	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). **Tip:** You can liimit the Text node to only use the fonts that ship with Nuke by navigating to **Project Settings** > **Font** and disabling **include system fonts**.
	index	Regular	Sets the font style to use for the text. The options available in this control depend on the **font** selected.
global font scale	global_font_scale	1	Sets the scale used to multiply the **font size** for all characters in the message field.
font size	font_size	100	Adjusts the size of the font. When **leading** is set to 0, this parameter also controls the spacing

Control (UI)	Knob (Scripting)	Default Value	Function
			between each line of text. When rendering the font, the **size** 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 **scale** parameter on the **Transform** tab) to control the size of the font and keep **scale** set to 1.
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	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. **Note:** Kerning has no effect on multiple selections or the first character in a string.
tracking	tracking	0	Sets the spacing between each character and the previous character. Negative values move characters closer to each other and vice versa. **Note:** Tracking has no effect on the last character in a string.
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 **animation layers** 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	Sets the order in which **skew X** and **skew Y** are applied: • **XY** - skew X is applied before skew Y. • **YX** - skew Y is applied before skew X.
center xy	center	N/A	Sets the center of rotation and scaling. You can also move it using **Ctrl/Cmd**+drag.
animation layers	group_animation	N/A	Displays groups created from the text in the **message** field, allowing you to animate the required characters using the transform controls. Select the required text in the Viewer or **message** field and then click the **+** button to create an animation layer. Select the group and apply the required transforms using the controls on the **Group** tab.
Color Tab			
ramp	ramp	none	Select whether to create a color gradient across

Control (UI)	Knob (Scripting)	Default Value	Function
			the text: • **none** - don't create a color gradient. • **linear** - the ramp changes linearly from one color into another. • **smooth0** - 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. • **smooth1** - 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. • **smooth** - 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.
color	color	1	Sets the color for the text. If **ramp** is set to anything other than **none**, this is the color for the ramp at the point 1 end (by default, the top end).
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. 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. 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 **inherit input color** 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 seperation 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

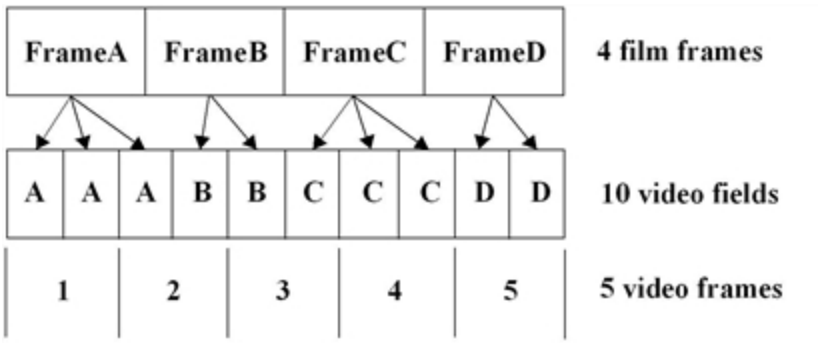
Time nodes deal with distorting time (that is, slowing down, speeding up, or reversing clips), applying motion blur, and performing editorial operations like slips, cuts, splices, and freeze frames.

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	The 3:2 pulldown process results in: • three whole frames that contain two fields from the same film frame, and • two split-field frames that contain fields from two different film frames. The two split-field frames are always adjacent to each other. 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.

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	Sets the number of frames to use to dissolve between clips. Bear in mind that differences in format between dissolved clips are not catered for, so you may want to use **Cross Dissolve** in conjunction with Reformat nodes.
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 **First Frame** value, displays the frame number of the end of the sequence after the slip.
take metadata from first clip	meta_from_first	disabled	When disabled, the metadata is taken from whichever input is currently taking precedence. 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.

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	An optional image to use as a mask. By default, the frame blend 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
frames			create the effect: • When **Custom** is disabled, blend together **Number of frames-1** previous frames and the current frame, creating a trail-like effect on moving objects. • When **Custom** is enabled, then the **Number of frames** are evenly distributed across the specified range.
Frame Range	startframe	-1	When **Custom** 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 **Frame Range** controls to specify the blended frame range.
Input Range	getinputrange	N/A	Click to automatically use the input sequence frames as the blend **FrameRange**.
Foreground matte	N/A	disabled	Enables the associated matte channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **none**.
	blendmask	none	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. To normalize the alpha, divide the number 1 by the

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 **none**.
	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 **mask** input to the predefined **mask.a** 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			
Mode	rounding_mode	Whole frames	How to calculate times: **Whole frames** - round all times down to whole frames. **Fractional time** - calculate exact times which may result in times between frames.
First Frame	firstFrame	1	The first frame to use. If **increment** is set to 0, **first frame** is used at every frame of the input clip.
Set to Current Frame	setToCurrentFrame	N/A	Click to set the **first frame** 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 **first frame** is set to 1, Nuke only uses frames 1, 6, 11, 16, and so on from the input.
Path Mask			
Enable Path Mask	enable_path_mask	off	Enables/ disables the use of a mask to allow only specific prims to have the operation applied to them.
Mask	mask_patterns	N/A	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1**

Control (UI)	Knob (Scripting)	Default Value	Function
			/GeoCard3 applies the effect to only those prims. **Default - Injected/Empty** - selects the default prim (s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below if that node has the default mask set.

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. 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 BgVecs	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. **Note:** The **BgVecs** input appears as an arrowhead on the side of the node.
	MoSrc	An alternate Motion Source input, for example, if your **Source** 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	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • it was not possible to create a context for processing on the selected GPU, such as when there

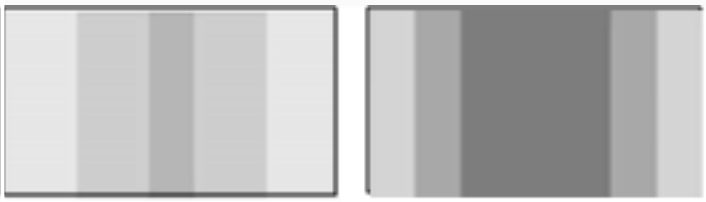
Control (UI)	Knob (Scripting)	Default Value	Function
			is not enough free memory available on the GPU. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Input Range	input.first	N/A	The first frame of input to use. When you first create the node, this is automatically set to the first frame of the **Source** clip. After that, it is only updated if you click **Reset**.
	input.last	N/A	The last frame of input to use. When you first create the node, this is automatically set to the last frame of the **Source** clip. After that, it is only updated if you click **Reset**.

Control (UI)	Knob (Scripting)	Default Value	Function
Reset	resetInputRange	N/A	Resets **Input Range** to the frame range of the current **Source** input. This can be useful if the clip in the **Source** input has changed.
Channels	retimedChannels	all	Sets the channels affected by the retime.
Method	interpolation	Motion	Sets the interpolation algorithm to use: • **Frame** - the nearest original frame is displayed. • **Blend** - 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. • **Motion** - vector interpolation is used to calculate the in-between frame.
Timing	timing2	Output Speed	Sets how to control the new timing of the clip: • **Output/Input Speed** - 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. • **Frame** - 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.
Output Speed	timingOutputSpeed	0.5	This control is only active if **Timing** is set to **Output Speed**. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Retimes can be difficult to control using **Output Speed**, because you're retiming output frames. Altering a keyframe alters the relative position of all later frames. However, **Output Speed** keyframes do allow you to use negative speed values, unlike **Input Speed** retimes.
Input Speed	timingInputSpeed	0.5	This control is only active if **Timing** is set to **Input Speed**. 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. **Note:** Retimes can be easier to control using **Input Speed**, because keyframes are set against the source frames, rather than the output frames. However, **Input Speed** keyframes do not allow you to use negative speed values, unlike **Output Speed** retimes.
Frame	timingFrame2	1	This control is active only if **Timing** is set to **Frame**. 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 **Frame** to 1 at frame 1 and the **Frame** to 50 at frame 100.
Motion	motionEstimation	Dependent on script	Sets the method of calculating motion estimation vectors: • **Local** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Regularized** - uses semi-global motion estimation to produce more consistent vectors between regions. **Note:** Scripts loaded from previous versions of Nuke default to **Local** motion estimation for backward compatibility. Adding a new Kronos node to the Node Graph defaults the **Method** to **Regularized** motion estimation.
Vector Detail	vectorDetail	0.3	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. Higher values pick up finer movement, but also increase processing time.
Strength	strength	1.5	This control is only active if **Method** is set to **Regularized**. 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. **Note:** The default value should work well for most sequences.
Smoothness	smoothness	0.5	This control is only active if **Method** is set to **Local**. A high smoothness can miss lots of local detail, but is less likely to provide you with the odd spurious

Control (UI)	Knob (Scripting)	Default Value	Function
			vector, whereas a low smoothness concentrates on detail matching, even if the resulting field is jagged. **Note:** The default value should work well for most sequences.
Resampling	resampleType	Bilinear	Sets the type of resampling applied when retiming: • **Bilinear** - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use **Bilinear** to preview a retime before using one of the other resampling types to produce your output. • **Lanczos4** and **Lanczos6** - these filters are good for scaling down, and provide some image sharpening, but take longer to process.
Shutter			
Shutter Samples	shutterSamples	1	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. Shutter Samples 2 Shutter Samples 20
Shutter Time	shutterTime	0	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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how **Shutter Time** affects the retimed rectangle.  Shutter Time 1 Shutter Time 0.5
Automatic Shutter Time	autoShutterTime	disabled	When enabled, Kronos automatically calculates the shutter time throughout the sequence. Note that this only produces motion blur when the retimed speed is greater than the original speed.
Output	output	Result	Sets the final output display for the retimed image. Selecting anything other than **Result** is only useful when a **Matte Channel** is used. • **Result** - displays the retimed **Source** image. • **Matte** - displays the retimed **Matte** input. • **Foreground** - displays the retimed foreground. The background regions outside the matte input may show garbage. • **Background** - displays the retimed background. The foreground regions inside the matte input may show garbage.
Matte Channel	matteChannel	None	Where to get the (optional) foreground mask to use for motion estimation: • **None** - do not use a matte. • **Source Alpha** - use the alpha of the **Source** input. • **Source Inverted Alpha** - use the inverted alpha of the **Source** input.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Matte Luminance** - use the luminance of the **Matte** input. • **Matte Inverted Luminance** - use the inverted luminance of the **Matte** input. • **Matte Alpha** - use the alpha of the **Matte** input. • **Matte Inverted Alpha** - use the inverted alpha of the **Matte** input.
Advanced			
Flicker Compensation	flickerCompensation	disabled	When enabled, Kronos 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. **Note:** Using **Flicker Compensation** increases rendering time.
Legacy Mode	legacymodeNuke9	Dependent on Nuke version	Scripts loaded from previous versions of Nuke default to **Legacy Mode** for backward compatibility. Adding a new Kronos node to the Node Graph hides this control. When enabled, Kronos reverts to the legacy method for calculating **Output Speed** using the **Local** motion estimation method.
Advanced > 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 **Weight Red** 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 **Overlay Vectors** 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: • **rint** - rounds the frame(s) to the nearest integer value. • **floor** - rounds the frame(s) down to the nearest integer value. • **ceil** - rounds the frame(s) up to the nearest integer value. • **none** - no rounding is applied to the requested frame(s).
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

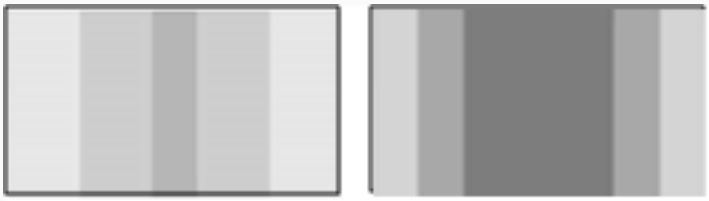
Connection Type	Connection Name	Function
Input	Source	The sequence to retime.

Control (UI)	Knob (Scripting)	Default Value	Function
OFlow Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Input Range	input.first	N/A	The first frame of input to use. When you first create the node, this is automatically set to the first frame of the **Source** clip. After that, it is only updated if you click **Reset**.
	input.last	N/A	The last frame of input to use. When you first create the node, this is automatically set to the last frame of the **Source** clip. After that, it is only updated if you click **Reset**.
Reset	resetInputRange	N/A	Resets **Input Range** to the frame range of the current **Source** input. This can be useful if the clip in the **Source** input has changed.
Channels	retimedChannels	all	Sets the channels affected by the retime.
Method	method	Motion	Sets the interpolation algorithm: • **Frame** - the nearest original frame is displayed. • **Blend** - 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. • **Motion** - vector interpolation is used to calculate the in-between frame.

Control (UI)	Knob (Scripting)	Default Value	Function
Timing	timing2	Output Speed	Sets how to control the new timing of the clip: • **Output/Input Speed** - 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. • **Frame** - 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.
Output Speed	timingOutputSpeed	0.5	This control is only active if **Timing** is set to **Output Speed**. 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. **Note:** Retimes can be difficult to control using **Output Speed**, because you're retiming output frames. Altering a keyframe alters the relative position of all later frames. However, **Output Speed** keyframes do allow you to use negative speed values, unlike **Input Speed** retimes.
Input Speed	timingInputSpeed	0.5	This control is only active if **Timing** is set to **Input Speed**. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Retimes can be easier to control using **Input Speed**, because keyframes are set against the source frames, rather than the output frames. However, **Input Speed** keyframes do not allow you to use negative speed values, unlike **Output Speed** retimes.
Frame	timingFrame2	1	This control is active only if **Timing** is set to **Frame**. 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 **Frame** to 1 at frame 1 and the **Frame** to 50 at frame 100.
Vector Detail	vectorDetail	0.2	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. Higher values pick up finer movement, but also increase processing time.
Smoothness	smoothness	0.5	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. **Note:** The default value should work well for most sequences.
Resampling	resampleType	Bilinear	Sets the type of resampling applied when retiming: • **Bilinear** - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use **Bilinear** to preview a retime before using one of the other resampling types to produce your output. • **Lanczos4** and **Lanczos6** - these filters are good for scaling down, and provide some image sharpening,

Control (UI)	Knob (Scripting)	Default Value	Function
			but take longer to process.
Shutter			
Shutter Samples	shutterSamples	1	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. Shutter Samples 2 Shutter Samples 20
Shutter Time	shutterTime	0	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. Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how **Shutter Time** affects the retimed rectangle.  Shutter Time 1 Shutter Time 0.5
Automatic Shutter Time	autoShutterTime	disabled	When enabled, OFlow automatically calculates the shutter time throughout the sequence. Note that this only produces motion blur when the

Control (UI)	Knob (Scripting)	Default Value	Function
			retimed speed is greater than the original speed.
Advanced			
Flicker Compensation	flickerCompensation	disabled	When enabled, OFlow 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. **Note:** Using **Flicker Compensation** increases rendering time.
Advanced > Tolerances			
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 **Weight Red** 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 **Overlay Vectors** 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
			Note: 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	The 3:2 pulldown process results in: • three whole frames that contain two fields from the same film frame, and • two split-field frames that contain fields from two different film frames. The two split-field frames are always adjacent to each other.

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	Video frames are usually divided into two fields. Each field contains only half of the image information, drawn as horizontal scan lines: • The first field of a frame contains every other scan line. • The second field of a frame contains the remaining scan lines. When both fields are displayed in rapid sequence, they appear to produce a normal, complete frame. **Invert field dominance** determines which field is displayed first: • When enabled, the odd lines come first. • When disabled, the even lines come first.

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. **Note:** If both **output range** fields are locked, the retime is calculated to make the frame ranges match. Otherwise the output frames move to accommodate the speed.
	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. **Note:** If both **output range** fields are locked, the retime is calculated to make the frame ranges match. Otherwise the output frames move to accommodate the speed.
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 **output range** controls. Values higher than 1 increase playback speed; values less than 1 decrease playback speed.
before	before	hold	Sets the behavior of frames before the **output.first** frame (examples refer to a 20 frame sequence with an **output.first** value of 5): • **continue** - the first frame in the sequence is held until the **output.first** frame is reached. • **loop** - substitutes an equal number of frames, effectively creating a clip loop. Example: 17, 18, 19, 20, 1, 2, 3, 4, etc. • **bounce** - substitutes a reversed equal number of frames, creating a clip bounce. Example: 5, 4, 3, 2, 1, 2, 3, 4, etc. • **hold** - the first frame in the sequence is held until the **output.first** frame is reached. Example: 1, 1, 1, 1, 1, 2, 3, 4, etc. • **black** - frames are black until the **output.first** frame is reached.
after	after	hold	Sets the behavior of frames after the **output.last** frame (examples refer to a 20 frame sequence with an

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

Control (UI)	Knob (Scripting)	Default Value	Function
			on the curve (a dip, in other words). You can: • **Ctrl**/**Cmd**+**Alt**+click to insert keyframe knots on the curve. • **Ctrl**/**Cmd**+drag to reposition keyframe knots. • **Ctrl**/**Cmd**+drag to rotate a keyframe knot control handles. **Note:** The curve must pass through 0,0 and 1,1 so that the in and out points work, respectively.
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	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option.

Control (UI)	Knob (Scripting)	Default Value	Function
			See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Vector Detail	vectorDetailReg	0.3	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. **Note:** High detail vectors take longer to render, but can improve the results you get from the VectorDistort node.
Strength	strengthReg	1.5	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. **Note:** The default value works well for most sequences.
Matte Channel	matteChannel	None	Where to get the optional foreground mask to use when estimating motion: • **None** - do not use a matte. • **Source Alpha** - use the alpha of the Source input. • **Source Inverted Alpha** - use the inverted alpha of the Source input. • **Matte Luminance** - use the luminance of the

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

Control (UI)	Knob (Scripting)	Default Value	Function
Flicker Compensation	flickerCompensation	disabled	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. **Note:** Using **Flicker Compensation** increases rendering time.
Tolerances			
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 **Weight Red** 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	

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	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. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
TemporalMedian Tab			
channels	channels	all	The temporal median filter effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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	Controls how the shutter behaves with respect to the current frame value: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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 **Project Settings**	The first frame of the range. You can also adjust this by going to the **Dope Sheet** tab and dragging the head of the clip to a new location.
	before	hold	Sets the behavior of frames before the **first** frame

Control (UI)	Knob (Scripting)	Default Value	Function
			(examples refer to a 20-frame sequence with a **first** value of 5): • **hold** - the first frame in the sequence is held until the **first** frame is reached. Example: 1, 1, 1, 1, 1, 2, 3, 4, etc. • **loop** - substitutes an equal number of frames, effectively creating a clip loop. Example: 17, 18, 19, 20, 1, 2, 3, 4, etc. • **bounce** - substitutes a reversed equal number of frames, creating a clip bounce. Example: 5, 4, 3, 2, 1, 2, 3, 4, etc. • **black** - frames are black until the **first** frame is reached.
	last	Dependent on **Project Settings**	The last frame of range. You can also adjust this by going to the **Dope Sheet** tab and dragging the tail of the clip to a new location.
	after	hold	Sets the behavior of frames after the **last** frame (examples refer to a 20 frame sequence with a **last** value of 5): • **hold** - the **last** frame in the sequence is held until the end of the sequence is reached. Example: 16, 17, 18, 19, 20, 20, 20, 20, etc. • **loop** - substitutes an equal number of frames, effectively creating a clip loop. Example: 16, 17, 18, 19, 20, 1, 2, 3, 4, etc. • **bounce** - substitutes a reversed equal number of frames, creating a clip bounce. Example: 16, 17, 18, 19, 20, 19, 18, 17, etc. • **black** - frames are black from **last** until the end of the sequence is reached.
frame	frame_mode	expression	Sets the frame mode: • **expression** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			place this first frame at frame 1 rather than frame 500, you can use the expression **frame+499**. 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 **frame*2**. 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. • **start at** - 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 **1** in the field, image0500.rgb is read in at frame 1. Similarly, if you enter **100** in the field, image0500.rgb is read in at frame 100. • **offset** - 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 **499** 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 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.

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

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: • **Plus** - uses the sum of all frames. Note that this may result in pixel values higher than 1.0. • **Max** - uses the highest value from the frames. • **Average** - averages the frames (uses the sum divided

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	Sets the number of frames to merge together, counting backwards from the current frame (and including the current frame). For example, if the current frame is 10, and you set this value to 4, TimeEcho merges frames 7, 8, 9, and 10.
Frames to fade out	framesfade	1	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. 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: • the first image is reduced to 20% of its original opacity • the second image is reduced to 40% of its original opacity • the third image is reduced to 60% of its original opacity • the fourth image is reduced to 80% of its original opacity • the fifth image remains at 100% of its original opacity.

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			
Mode	rounding_ mode	Whole frames	How to calculate times: **Whole frames** - round all times down to whole frames. **Fractional time** - calculate exact times which may result in times between frames.
Time Offset (frames)	time_offset	0	The number of frames by which you want to offset the clip. 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.
Reverse Input	reverse_input	off	When enabled, TimeOffset inverts the clip (making the last frame the first, and so on).
Path Mask			
Enable Path Mask	enable_path_ mask	off	Enables/ disables the use of a mask to allow only specific prims to have the operation applied to them.
Mask	mask_patterns	N/A	Specifies the mask pattern to match the prim names to

Control (UI)	Knob (Scripting)	Default Value	Function
			affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/Empty** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below if that node has the default mask set.

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	Sets which frame of the input sequence appears at the current frame. For example, you could set frame 10 of the input to output at frame 5, effectively doubling the speed of the sequence.
curve editor	N/A	N/A	Click to open up the Curve Editor.
input length	length	1	Sets the length of time to average together to produce the output frame. Click the **set to df/dt** button to automatically set the **inputlength** to the correct formula based on the derivative of the **inputframe**.

Control (UI)	Knob (Scripting)	Default Value	Function
set to df/dt	N/A	N/A	Click to automatically set the **inputlength** to the correct formula based on the derivative of the **inputframe**.
filter	filter	box	Sets the type of filtering to apply to the time warp: • **none** - passes fractional frame numbers to the input, which is useful if the input can calculate its own frame interpolation. • **nearest** - rounds the center of the range to nearest integer frame. • **box** - uses a weighted average of several frames together to cover the output range.

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	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. An optional matte of the foreground. This can be used to help the

Connection Type	Connection Name	Function
		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.
	Source	The sequence from which to generate motion vectors.

Control (UI)	Knob (Scripting)	Default Value	Function
VectorGenerator Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Method	motionEstimation	Dependent on script	Sets the method of calculating motion estimation vectors: • **Local** - uses local block matching to estimate motion vectors. This method is faster to process, but can lead to artifacts in the output. • **Regularized** - uses semi-global motion estimation to produce more consistent vectors between regions. **Note:** Scripts loaded from previous versions of Nuke default to **Local** motion estimation for backward compatibility. Adding a new VectorGenerator node to the Node Graph defaults the **Method** to **Regularized** motion estimation.
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

Control (UI)	Knob (Scripting)	Default Value	Function
			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	This control is only active if **Method** is set to **Regularized**. 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. **Note:** The default value should work well for most sequences.
Smoothness	smoothness	0.5	This control is only active if **Method** is set to **Local**. 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. **Note:** The default value should work well for most sequences.
Matte Channel	matteChannel	None	Where to get the (optional) foreground mask to use for motion estimation: • **None** - do not use a matte.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Source Alpha** - use the alpha of the **Source** input. • **Source Inverted Alpha** - use the inverted alpha of the **Source** input. • **Mask Luminance** - use the luminance of the **Matte** input. • **Mask Inverted Luminance** - use the inverted luminance of the **Matte** input. • **Mask Alpha** - use the alpha of the **Matte** input. • **Mask Inverted Alpha** - use the inverted alpha of the **Matte** input.
Output	output	Foreground	When a matte input is supplied, this determines whether the motion vectors corresponding to the background or the foreground regions are output. • **Foreground** - the vectors for the foreground motion are output. • **Background** - the vectors for the background motion are output.
Advanced			
Flicker Compensation	flickerCompensation	disabled	When enabled, VectorGenerator 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. **Note:** Using **Flicker Compensation** increases rendering time.

Control (UI)	Knob (Scripting)	Default Value	Function
Advanced > Tolerances			
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 **Weight Red** 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. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
and	channels2	none	Additional channels to add. If you set this to something other than **all** or **none**, 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. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
and	channels4	none	Additional channels to add. If you set this to something other than **all** or **none**, 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. **Note:** The current version only accepts rgba and gray shades for other channels.

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**. This input is optional.

Connection Type	Connection Name	Function
	B	The image that contains a channel to merge with a channel from input **A**. If no **A** input is connected, both channels to merge are taken from this input.
	mask	An optional image to use as a mask. By default, the merge 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 **mask** control is disabled or set to **none**.

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 **none**.
	A	rgba.alpha	The channel to merge from input **A**. If no **A** input is connected, this channel is taken from input **B**.
operation	operation	union	Sets how the pixel values from input **A** are calculated with the pixel values from input **B** to create the new pixel values that are output as the merged image: • **absminus** abs(A-B) - how much the pixels differ. • **b if not a** A?A:B - shows A wherever A exists; otherwise shows B. • **divide** A/B, 0 if A<0 and B<0 - divides the values but stops two negative values from becoming a positive number. • **from** (B-A) - subtracts A from B. • **in** Ab - only shows the areas of image A that overlap with the alpha of B. • **max** (max(A,B)) - selects the lighter of the two colors as the resulting color. Only areas darker than

Control (UI)	Knob (Scripting)	Default Value	Function
			B are replaced, while areas lighter than B do not change. • **min** (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. • **minus** (A-B) - subtracts B from A. • **multiply** (AB, A if A<0 and B<0) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged. • **out** A(1-b) - only shows the areas of image A that do not overlap with the alpha of B. • **plus** A+B - the sum of the two colors. Increases brightness to lighten A and reflect B. • **stencil** 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. • **union** A+B-AB - shows both image A and B. • **xor** A+B-2AB - shows both image A and B where the images do not overlap.
B channel	N/A	enabled	Enables the associated B channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	B	rgba.alpha	The channel to merge from input **B**.
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 merged image into this output channel.
Set BBox to	bbox	union	How to output the bounding box: • **union** - combine the two bounding boxes.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **B side** - use the bounding box from input **B**. Any data from the **A** input that's outside this box is clipped. • **A side** - use the bounding box from input **A**. Any data from the **B** input that's outside this box is clipped.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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	The image that contains a channel to replace with a channel from the **A** input.
	mask	An optional image to use as a mask. By default, the **A** input is used where the mask is white, the **B** input where the mask is black, and a blend between the inputs where the mask is gray. 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 **mask** control is disabled or set to **none**.

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 **none**.
	from0	rgba.alpha	A channel to copy from input **A**.
to	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	to0	rgba.alpha	The channel that the above **Copy channel** replaces in input **B**.
Copy channel	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	from1	rgba.alpha	Another channel to copy from input **A**.

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 **none**.
	to1	rgba.alpha	The channel that the above **Copy channel** replaces in input **B**.
Copy channel	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	from2	rgba.alpha	Another channel to copy from input **A**.
to	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	to2	rgba.alpha	The channel that the above **Copy channel** replaces in input **B**.
Copy channel	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	from3	rgba.alpha	Another channel to copy from input **A**.
to	N/A	enabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	to3	rgba.alpha	The channel that the above **Copy channel** replaces in input **B**.
Layer Copy	channels	none	Copies all the selected channels from **A** to **B**, if they exist in **A**. If they don't exist in **A**, the channels from **B** are used unchanged. This allows you to easily copy multiple channels from **A** to **B**. For example, setting this to **all** copies all the channels that exist in **A**.

Control (UI)	Knob (Scripting)	Default Value	Function
			If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Set BBox to	bbox	union	How to output the bounding box: • **union** - combine the two bounding boxes. • **B side** - use the bounding box from input **B**. Any data from the **A** input that's outside this box is clipped. • **A side** - use the bounding box from input **A**. Any data from the **B** input that's outside this box is clipped.
metadata from	metainput	B	Sets the source of the metadata passed down the node tree: • **B** - only input B metadata is preserved. • **A** - only input A metadata is preserved. • **All** - both input A and B metadata is preserved.
range from	rangeinput	B	Sets the output frame range passed down the node tree: • **B** - only frames from input B are output. • **A** - only frames from input A are output. • **All** - both input A and B frames are output.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	maskChannelInput	none	The channel to use as a mask. By default, the **A** input is used where the mask is white, the **B** input where the mask is black, and a blend between the inputs where the mask is gray.
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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** input is used where the mask is white and the **A** input where the mask is black.
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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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: • **remove** - removes the channels you select below. • **keep** - keeps the channels you select below and removes all other channels.
channels	channels	all	The channels to remove (or keep if you've set **operation** to **keep**). If you set this to something other than **all** or **none**, 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 **operation** to **keep**). If you set this to something other than **all** or **none**, 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
			operation to **keep**). If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
and	channels4	none	Additional channels to remove (or keep if you've set **operation** to **keep**). If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.

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. You can also select **new** here to create new channels.
	in1	rgba	
In	fromInput2	B	Additional incoming channels to rearrange. If you only want to rearrange channels from one layer, you don't need these controls. You can also select **new** here to create new channels.
	in2	none	
Output Layer			
N/A	out1	rgba	The rearranged channels are output to this layer. You can also select **new** 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 **new** 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	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. You can also select **new** here to create new channels.

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	An optional image to use as a mask. By default, the offset 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 **mask** control is disabled or set to **none**.

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 **all** or **none**, 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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			using one color correct node. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the clamp 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
MinClampTo	MinClampTo	0	The value to which low illegal values are clamped when **MinClampTo** 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	When enabled, all values below **minimum** are clamped to the **MinClampTo** value. When disabled, all values below **minimum** are clamped to the **minimum** value.
MaxClampTo	MaxClampTo	1	The value to which high illegal values are clamped when **MaxClampTo** 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	When enabled, all values above **maximum** are clamped to the **MaxClampTo** value. When disabled, all values above **maximum** are clamped to the **maximum** value.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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	When enabled, only apply the effect to the edge of the mask. When disabled, the effect is applied to the entire mask.

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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the zebra stripes are 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ClipTest Tab			
channels	channels	rgba	The zebra stripes are only applied to these channels. You can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	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. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
CMSTestPattern Tab			
RGB 3D LUT 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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

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

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	You can use the **shadow** and **highlight** 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. **Warning:** DO NOT adjust the **midtone** curve. Midtones are always equal to 1 minus the other two curves.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
invert	invert_unpremult	disabled	Inverts the use of the (un)premultiply channel.
mix luminance	N/A	enabled	Enables the **mix luminance** slider. Disabling this checkbox is the same as setting **mix luminance** 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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ColorLookup Tab			
channels	channels	rgba	The color correction is only applied to these channels. You can use the checkboxes on the right to select individual channels.
use precomputed table	use_precomputed	enabled	When enabled, ColorLookup uses a precomputed lookup table (LUT) between 0 and the value specified in the **range** 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	You can use the lookup curves to edit the range of the image in individual channels, or ganged using the **master** curve (which represents all channels). To edit one curve with reference to another, select multiple curves. 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 **Ctrl/Cmd**+**Alt** 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.
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	Adds points on the r, g, and b curves, mapping **source** to **target**. You can use this control to match shadow, midtone, and highlights on two plates, for example. Set **source** to shadow rgb in one, **target** to shadow rgb in the other, then press **Set RGB**. Same for midtone and highlight areas.
Set RGBA	setRGBA	N/A	Adds points on the r, g, b, and alpha curves, mapping **source** to **target**.
Set A	setA	N/A	Adds points on the alpha curve, mapping **source** to

Control (UI)	Knob (Scripting)	Default Value	Function
			target.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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.

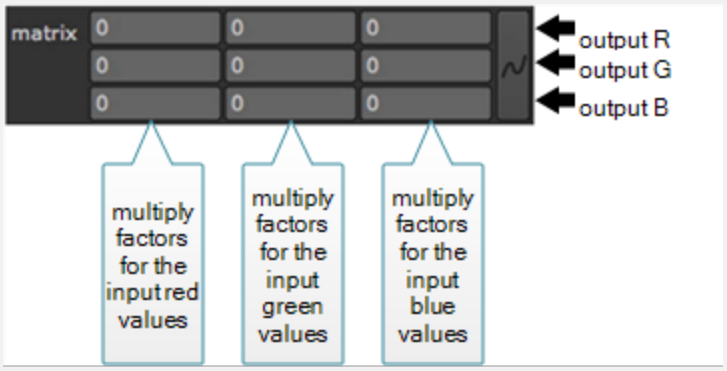
Control (UI)	Knob (Scripting)	Default Value	Function
			If you are using unpremultiplied input images, you should leave this set to **none**.
invert	invert_unpremult	disabled	Inverts the use of the (un)premultiply channel.
mix	mix	1	Dissolves between the original image at 0 and the full color correction 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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ColorMatrix Tab			
channels	channels	rgb	The color correction is only applied to these channels. You can use the checkboxes on the right to select individual channels.
matrix	matrix	0	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).  For example, if you enter **0.5**, **1**, and **2** 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. You can get the values for the matrix from the Colorspace node's **color matrix output** control, for example. **Ctrl/Cmd** + drag the Animation menu to copy the whole matrix at once.
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 **none**.

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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the colorspace conversion 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 **mask** control is disabled or set to **none**.

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

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

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 **input** and **output** colorspace knobs. This can be useful if you're doing certain comp tasks that work better in certain colorspaces, such as grading. For example, you might go from **ACEScc** (input) to **scene_linear** (output) in a Colorspace node, perform a Grade node adjustment, copy the first Colorspace node after the Grade node, and click the **swap input/output** button to go back to **ACEScc**.
Bradford matrix	bradford_matrix	disabled	If the **illuminant_in** and **illuminant_out** values are not the same, you can enable this to apply an illuminant adaptation transform. This alters colors so they *appear* the same. When disabled, the input and output colors have the same CIE colorspace XYZ values.
color matrix output	colormatrix	N/A	If a matrix is used in the color transform chosen above, the output appears here. Changing the matrix values has no effect, but you can copy them into a ColorMatrix node to apply them to an image. **Ctrl/Cmd** + drag the Animation menu to copy the whole matrix at once. See ColorMatrix for more information. **Note:** A colorspace conversion may be doing far more than just a single 3x3 matrix operation!
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.

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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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 (or x, y, w, h)	ROI	N/A	The region of interest. This is the area in input **A** with the colors to match. By default, it is set to cover the entire input. You can adjust the following: • **x** - the distance (in pixels) between the left edge of image **A** and the left side of the ROI. • **y** - the distance (in pixels) between the bottom edge of image **A** and the bottom edge of the ROI. • **r** - the distance (in pixels) between the left edge of image **A** and the right side of the ROI. • **t** - the distance (in pixels) between the bottom edge of image **A** and the top edge of the ROI. • **w** - the width of the ROI. This is only available if you click the **wh** button.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **h** - the height of the ROI. This is only available if you click the **wh** button. You can also adjust the ROI in the Viewer by dragging its edges. When adjusting the ROI, you may want to connect the Viewer to input **A** rather than the ColorTransfer node, so you can better see the area you are selecting.

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	An optional image to use as a mask. By default, the effects are 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Crosstalk Tab			
[crossover curves]	crossover	N/A	From the curve list on the left, select the curve you want to modify. For example, you'd select **red** to only modify the red values. You can also select **R->G**, 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, **Ctrl**/**Cmd**+**Alt**+click on the curve.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the effects are 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			result, when passed through a Log2Lin node, approximately matches the **Linear** result. **Note:** You can match **Linear** exactly if you set **gamma** to 0.6 and enable **ignore** in the Log2Lin node **Properties** panel.
blackpoint	blackpoint	0	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. 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 node controls until only the darkest pixels are visible. Adjusting the Viewer gain does not affect the colors you sample.
Adjust in	mode	Densities	Sets the range imposed on the **red**, **green**, and **blue** sliders to alter the exposure of the input image: • **Stops** • **Lights** • **Densities** (log10(density) of 0.6 gamma negative stock) • **Cineon** (offset of Cineon 10-bit log data) Adjusting the color sliders has the same effect in all modes, the range is a matter of user preference.
gang	gang	enabled	When enabled, the color sliders are ganged together - adjustments to one affect all three equally.
red	red	0	Adjusts the exposure in the red channel using the range specified by the **Adjust in** control.
green	green	0	Adjusts the exposure in the green channel using the range specified by the **Adjust in** control.

Control (UI)	Knob (Scripting)	Default Value	Function
blue	blue	0	Adjusts the exposure in the blue channel using the range specified by the **Adjust in** control.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.

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	An optional image to use as a mask. By default, the expressions are 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 **mask** control is disabled or set to **none**.

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	The channel(s) to which you want to apply the expression in the below = field. You can use the checkboxes on the right to select

Control (UI)	Knob (Scripting)	Default Value	Function
			individual channels.
=	expr0	N/A	The expression to apply to the above channels. For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type **(random*r)*20** here. To reference pixels in other channels, use **layer.channel** (for example, **matte.garbage**). 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 **r**, **g**, **b**, and **a** to reference the red, green, blue, and alpha channels in the **rgba** layer.
channels	channel1	green	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr1	N/A	The expression to apply to the above channels. For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type **(random*r)*20** here. To reference pixels in other channels, use **layer.channel** (for example, **matte.garbage**). 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 **r**, **g**, **b**, and **a** to reference the red, green, blue, and alpha channels in the **rgba** layer.
channels	channel2	blue	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.

Control (UI)	Knob (Scripting)	Default Value	Function
=	expr2	N/A	The expression to apply to the above channels. For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type **(random*r)*20** here. To reference pixels in other channels, use **layer.channel** (for example, **matte.garbage**). 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 **r**, **g**, **b**, and **a** to reference the red, green, blue, and alpha channels in the **rgba** layer.
channels	channel3	alpha	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr3	N/A	The expression to apply to the above channels. For example, to assign noise to the above channel(s) and then boost the gain of that result by 20, you would type **(random*r)*20** here. To reference pixels in other channels, use **layer.channel** (for example, **matte.garbage**). 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 **r**, **g**, **b**, and **a** to reference the red, green, blue, and alpha channels in the **rgba** layer.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	maskChannelInput	none	The channel to use as a mask. By default, the expressions are limited to the non-black areas of this channel.

Control (UI)	Knob (Scripting)	Default Value	Function
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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: (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*x + y*y). 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. 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. 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: (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. 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: 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	An optional image to use as a mask. By default, the gamma adjustment 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Gamma Tab			
channels	channels	all	The gamma adjustment is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
value	value	1	The gamma value. The default value of 1 equals no change. Note that you can enter formulae into this field, making it easy to do quick calculations. For example, you could type **1/2.2** here and press **Return** to get 0.45454545.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	The file format of the LUT file you want to generate. If this is set to **auto** (the default), Nuke guesses the format from the file name extension. The following file extensions are recognized: • **.3dl** - Autodesk and ASSIMILATE Scratch LUT format (3D). • **.blut** - Side Effects Houdini binary LUT format (3D). • **.cms** - Light Illusion LightSpace CMS LUT format (1D and 3D). • **.csp** - Rising Sun Research CineSpace LUT format (3D). • **.cub** - FilmLight Truelight LUT format (1D and 3D). • **.cube** - IRIDAS LUT format (1D and 3D). • **.vf** - Nuke's native LUT format used by the Vectorfield node (3D).

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 (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

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 **logarithmic** images, others **linear**. 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 ouput	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	Select the format you want to use for your .3dl file. The final cube size is determined by the CMSTestPattern which generates the input. • **autodesk flame/smoke** - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65. • **autodesk lustre** - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65, and output a 3DMESH/Mesh header. • **assimilate scratch** - scale and offset the 3D LUT. This should be used only for legacy scratch files prior to Flame compatibility.
Generate and Write LUT	generate	N/A	Generate the LUT file and save it to the **output file** 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.
- **Crtl**/**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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Grade Tab			
channels	channels	rgb	The color correction is only applied to these channels. You can use the checkboxes on the right to select individual channels.
blackpoint	blackpoint	0	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. 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.
whitepoint	whitepoint	1	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.

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	Any pixels that are black are set to this color. This allows you to, for example, match the tonal range of one clip with that of another. First, set **blackpoint** to the darkest pixel in the image whose colors you want to change (pressing **Alt** 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 **Alt** to make sure you sample from the output).
gain	white	1	Any pixels that are white are set to this color. This allows you to, for example, match the tonal range of one clip with that of another. First, set **whitepoint** to the lightest pixel in the image whose colors you want to change (pressing **Alt** 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 **Alt** to make sure you sample from the output).
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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 **none**.
	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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

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	Allows you to extend the image's tonal range, which has the effect of increasing contrast. 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. 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. To set the midtone, or neutral, value, drag the middle input slider. This applies a gamma correction

Control (UI)	Knob (Scripting)	Default Value	Function
			(lightens or darkens the midtones). The histogram updates as you adjust these controls.
output range	out	0, 1	Sets the range to which the **input range** 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. Any pixels that are black are set to the value on the left. This makes shadows lighter. Any pixels that are white are set to the value on the right. This makes highlights darker. The histogram updates as you adjust these controls.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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 **none**.
	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 **none**.
	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	brtsrcs	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 **none**.
	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 **none**.
	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	An optional image to use as a mask. By default, the correction 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 **mask** control is disabled or set to **none**.

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

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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** here. This will simulate applying the correction before

Control (UI)	Knob (Scripting)	Default Value	Function
			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. If you are using unpremultiplied input images, you should leave this set to **none**.
invert	invert_unpremult	disabled	Inverts the use of the (un)premultiply channel.
mix luminance	N/A	enabled	Enables the **mix luminance** slider. Disabling this checkbox is the same as setting **mix luminance** 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	An optional image to use as a mask. By default, the shift 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
HueCorrect Tab			
channels	channels	rgb	The shift is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **saturation along axis** control to affect the saturation.
saturation along axis	color_saturation	1	Adjusts the color saturation in the direction specifed by the **color axis** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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 **none**.
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	An optional image to use as a mask. By default, the inversion 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Invert Tab			
channels	channels	all	The inversion is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards.

Control (UI)	Knob (Scripting)	Default Value	Function
			If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the shift is conversion 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Log2Lin Tab			
channels	channels	rgb	The conversion is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
operation	operation	log2lin	Sets whether the conversion is from or to Cineon log colorspace: • **log2lin** - from Cineon colorspace. • **lin2log** - to Cineon colorspace.
black	black	95	Sets the value in the Cineon file that is converted into 0.
reset	N/A	N/A	Click to reset the **black** 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 **white** 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 **gamma** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			Premult node after, but allows you to work faster if you're only using one node. If you are using unpremultiplied input images, you should leave this set to **none**.
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	The image sequence you want the **Source** clip to match. When **Task** is set to **Match Graded Source**, this should be a graded version of the **Source** footage.

Connection Type	Connection Name	Function
		When **Task** is set to **Match Different Clip**, this should be a different clip rather than a version of the **Source** 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	Choose whether you want to match the **Source** input with a graded version of the same clip or a different clip: • **Match Graded Source** - Match the **Source** clip with a graded version of the same clip (connected to the **Target** input). This allows you to extract and export a baked-in grade applied to the original clip. In this mode, MatchGrade expects the same frames in both its inputs. • **Match Different Clip** - Match the colors of one clip (**Source**) with those of another (**Target**). This allows you to create a grade to reproduce the look of the **Target** clip in the **Source** clip. In this mode, MatchGrade expects different frames in the **Source** and **Target** inputs.
Analysis	analysisType	Analyze Reference Frames	Set the type of analysis to perform: • **Analyze Reference Frames** - 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 **Source** sequence. You can use the controls under **Ref Frames** to choose the reference frames. • **Auto-analyze Per Frame** - Calculate a local

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

Control (UI)	Knob (Scripting)	Default Value	Function
			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. **Note:** This control is only displayed when the **Mask** control is set to anything other than **None**.
Output	output	Matched	Select what to display in the Viewer: • **Matched** - View the color matched result. • **Source** - View the **Source** input. This can be useful when setting reference frames for the **Source** input. • **Target** - View the **Target** input. This can be useful when setting reference frames for the **Target** input.
Align Target to Source	alignTargetToSource	N/A	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. You can use **Align Target to Source** if the clips are not aligned in time and space, such as when the target clip has been reformatted. **Note:** This control is only available when **Task** is set to **Match Graded Source**.
Crop Target	autoCrop	disabled	When enabled, clicking **Align Target to Source** generates a rectangular crop for the target input. You can use **Crop Target** if the target contains

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

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **Task** is set to **Match Different Clip**.
	addTargetRefFrame	N/A	Set the current **Target** input frame as a reference frame. **Note:** This control is only available when **Task** is set to **Match Different Clip**.
	deleteTargetRef-Frame	N/A	Remove the current **Target** input frame from the reference frames. **Note:** This control is only available when **Task** is set to **Match Different Clip**.
Analysis			
Transform	transform	3D LUT	Set the transformation used to grade the **Source** input: • **3D LUT** - Calculate the grade as a 3D look-up table (LUT). If necessary, you can use the **Export** controls to write this to a **.csp** format and then click **Create OCIOFileTransform** to create an OCIOFileTransform node that applies the grade. • **CDL** - Calculate the grade as a color decision list (CDL). If necessary, you can click **Create OCIOCDLTransform** to create an OCIOCDLTransform node that applies the grade.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The CDL transform is limited and cannot model all types of color transformation. In most cases, selecting **3D LUT** gives the best results. **Note:** This control is only available when you have set at least one reference frame.
Pre LUT	prelut	Auto Detect	Specify a 1D shaper LUT to use for the analysis: • **Auto Detect** - Automatically detect the best pre-LUT to use. • **Linear** - Use a linear pre-LUT. • **Logarithmic** - Use a logarithmic pre-LUT.
LUT Resolution	lutres	32	Set the resolution of the LUT in which MatchGrade stores the color transformation. A value of 16 speeds up processing. A value of 64 can improve the results, but also increases processing time. If two very similar colors in the **Source** image are very different in the **Target**, try setting this to 64, which is the maximum value.
Colorspace	colorspace	RGB	Set the colorspace to use: • **RGB** • **YUV** • **LAB** The correct setting to use depends on the nature of the transformation. Try each option to see which works best with your footage.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **Task** is set to **Match Different Clip**.
Iterations	iterations	6	The number of refinement passes. Higher values can produce a better color match, but also take longer to process. **Note:** This control is only available when **Task** is set to **Match Different Clip**.
Analyze Reference Frames	analyzeRefFrames	N/A	Click this to calculate the grade. **Note:** This control is only available when you have set at least one reference frame.
slope	slope	N/A	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. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
lock	lockSlope	disabled	Lock the **slope** value to prevent MatchGrade from recalculating it when **Recalculate CDL** is pressed.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
offset	offset	N/A	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. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
lock	lockOffset	disabled	Lock the **offset** value to prevent MatchGrade from recalculating it when **Recalculate CDL** is pressed. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
power	power	N/A	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. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.

Control (UI)	Knob (Scripting)	Default Value	Function
lock	lockPower	disabled	Lock the **power** value to prevent MatchGrade from recalculating it when **Recalculate CDL** is pressed. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
saturation	saturation	N/A	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. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
lock	lockSaturation	disabled	Lock the **saturation** value to prevent MatchGrade from recalculating it when **Recalculate CDL** is pressed. **Note:** This control is only available when **Transform** is set to **CDL** and you have clicked **Analyze Reference Frames**.
error	cdlError	N/A	Displays the error for the CDL transform. The smaller the value, the better the results. This value cannot be edited.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **Transform** is set to **3D LUT** and you have clicked **Analyze Reference Frames**.
Create OCIOFile-Transform	createOCIOFile-Transform	N/A	Click this to create an OCIOFileTransform node that you can use elsewhere in the script to apply the same grade. **Note:** This control is only available when **Transform** is set to **3D LUT** and you have clicked **Analyze Reference Frames**.
Create OCIOCDL-Transform	createOCIOCDL-Transform	N/A	Click this to create an OCIOFileTransform node that you can use elsewhere in the script to apply the same grade. The button behaves differently depending on the **Transform** control's setting: • **3D LUT** - Use the **LUT output file** and **Write** controls to write the LUT to a **.csp** file and then click **Create OCIOFileTransform** to create an OCIOFileTransform node that applies the grade. • **CDL** - Click **Create OCIOCDLTransform** to create an OCIOCDLTransform node that applies the CDL grade.
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

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 **all** or **none**, you can use the checkboxes on the right to select individual channels.
modify	modify	all	Sets the channels to which the calculated delta is added. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **target** value.
direction	adjdir	Up	Sets the conditions under which the image is modified: • **Up** - only apply changes if the calculated delta is positive. • **Down** - only apply changes if the calculated delta is negative. • **Both** - apply changes if the calculated delta is positive or negative.
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 knows 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	An optional image to use as a mask. By default, the multiplication 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Multiply Tab			
channels	channels	all	The multiplication is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may

Control (UI)	Knob (Scripting)	Default Value	Function
			want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the CDL transform is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
OCIOCDLTransform Tab			
channels	channels	rgb	The CDL transform is applied only to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **Inverse** 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. You can view the **Slope**, **Offset**, **Power** and **Saturation** 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 **none.**
	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 **mask** input to the predefined **mask.a** 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. 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**.

Control (UI)	Knob (Scripting)	Default Value	Function
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the colorspace transform is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **input** and **output** colorspace knobs. This can be useful if you're doing certain comp tasks that work better in certain colorspaces, such as grading. For example, you might go from **ACEScc** (input) to **scene_linear** (output) in a OCIOColorspace node, perform a Grade node adjustment, copy the first Colorspace node after the Grade node, and click the **swap input/output** button to go back to **ACEScc**.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none.**
	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 **mask** input to the predefined **mask.a** 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. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			channel to **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	Allows you to add variables to register certain viewer processes by creating a custom **config.ocio** and specifying the variable in the **to_reference** file transform. See Nuke's online help 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	

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	An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

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 **invert direction** 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 **config.ocio** and specifying the variable in the **to_reference** file transform. See Nuke's online help 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	An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

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 **all** or **none**, you can use the checkboxes on the right to select individual channels.
file	file	none	The file to use for the transform. Supported formats: • .3dl (Flame) • .3dl (Lustre) • .ccc (ColorCorrectionCollection) • .cc (ColorCorrection) • .csp (Cinespace) • .lut (Houdini) • .itx (Iridas_itx) • .cube (Iridas_cube) • .mga (Pandora_mga) • .m3d (Pandora_m3d) • .spi1d (spi1d) • .spi3d (spi3d) • .spimtx (spimtx) • .cub (Truelight) • .vf (Nukevf)

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 (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

invert direction	invert	disabled	Select **invert direction** to invert the transform.
interpolation	interpolation	linear	Specifies the interpolation method. This is ignored if

Control (UI)	Knob (Scripting)	Default Value	Function
			the file used is not a LUT. The following interpolation methods are listed from fastest to most accurate: • **nearest** • **linear** • **tetrahedral** • **best**
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 **working space**, 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 **none.**
	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 **mask** input to the predefined **mask.a** 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. 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**.

Control (UI)	Knob (Scripting)	Default Value	Function
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the colorspace transform is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
OCIOLogConvert Tab			
channels	channels	rgb	The colorspace conversion is applied only to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
operation	operation	log to lin	Specifies the operation to perform: • **log to lin** - Performs a log to linear colorspace conversion. • **lin to log** - Performs a linear to log colorspace conversion.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none.**
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
channels	channels	rgb	The colorspace conversion is applied only to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
input	in_colorspace	scene_linear (linear)	Specifies the input colorspace. **Note:** The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.
look	look	N/A	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: • Multiple looks are combined with , (comma): 'a,b' • Direction is specified with +/- prefixes for forward and inverse: '+a, -b' • Missing look fallbacks are specified with | (pipe): 'a, -b, | -b' **Note:** ACES 1.3 OCIO configs include a **Reference Gamut Compression** 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 **look** dropdown.
reload	reload	N/A	Click to reload all files used in the specified look(s).
invert	invert	disabled	Select **invert direction** to invert the transform.

Control (UI)	Knob (Scripting)	Default Value	Function
direction			
output	out_colorspace	scene_linear (linear)	Specifies the output colorspace to which the input is converted. **Note:** The control label has been updated, but the knob name currently remains the same. The knob name will also change in a future release.
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 **input** to the **output** colorspaces specified.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none.**
	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 **mask** input to the predefined **mask.a** 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. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			none.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	Allows you to add variables to register certain viewer processes by creating a custom **config.ocio** and specifying the variable in the **to_reference** file transform. See Nuke's online help 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	

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	An optional image to use as a mask. By default, the colorspace conversion is limited to the non-black areas of the mask. 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			you can use the checkboxes on the right to select individual channels.
named transform	named_transform	none	Sets the named transform to apply to the input image. Select the family name first and then transform form the dropdown. For example, **Input** > **ARRI** > **LogC3 - Curve (EI800)**. The transforms available are contained in the selected OCIO config file under the **named_transforms:** section.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none.**
	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 **mask** input to the predefined **mask.a** 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. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	Allows you to add variables to register certain viewer processes by creating a custom **config.ocio** and specifying the variable in the **to_reference** file transform. See Nuke's online help 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	

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	• If you are using this node to convert your input file to linear, attach the Read node here. • If you are using this node to convert to logarithmic for output, attach the node whose result you want to output here.
	mask	An optional image to use as a mask. By default, the colorspace conversion 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 **mask** control is disabled or set to **none**.
Output		• 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. • If you are using this node to convert to logarithmic for output, attach the Write node here.

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

Control (UI)	Knob (Scripting)	Default Value	Function
operation	operation	log to lin	Select the operation you want the node to perform: • **log to lin** - convert the input from logarithmic to linear colorspace. • **lin to log** - convert the input from linear to logarithmic colorspace.
linear reference value	linref	0.18	Set this to the linear value that corresponds with the **log reference value**. For example, you could leave this at 0.18 (mid-gray) and enter the logarithmic value that corresponds with 0.18 in the **log reference value** field.
log reference value	logref	445	Set this to the logarithmic value that corresponds with the **linear reference value**.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the posterize effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Posterize Tab			
channels	channels	all	The posterize effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	An optional image to use as a mask. By default, the contrast changes are 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
RolloffContrast Tab			
channels	channels	rgba	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **center** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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 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
			none.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	Loo kup curves are only generated for these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
sampler xy	sampler	0, 0	Sets the position of the sampler widget that determines the scanline to convert into a lookup curve. **Note:** The **sampler x** coordinate is ignored.
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 **sampler y** 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	An optional image to use as a mask. By default, the saturation adjustment 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Saturation Tab			
channels	channels	all	The saturation adjustment is only applied to these channels. You can use the checkboxes on the right to select individual channels.
saturation	saturation	1	Sets the saturation for the input image. A value of 1 equals no change. A value of 0 produces a grayscale image.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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	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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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	Sets the color compression mode: • **none** - no compression is applied. • **preserve hue and brightness** - if r, g, or b are greater than **softclip max**, the saturation is reduced to get it below **softclip max** while preserving the brightness. • **preserve hue and saturation** - if r, g, or b are greater than **softclip max**, the brightness is reduced to get it below **softclip max**. • **logarithmic compress** - compress all components between **softclip min** and **max** through a logarithmic curve between **softclip min** and 1.0.
softclip min	softclip_min	0.8	Sets the lower clipping limit. All values above **softclip min** are compressed. **Note:** When using **logarithmic compress**, this value should be set to 0 or 1 to avoid artefacts for high **softclip max** values.
softclip max	softclip_max	1	Sets the upper clipping limit. RGB values between **softclip min** and this value are compressed to be between **softclip min** and 1.

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	An optional image to use as a mask. By default, the color correction 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Toe Tab			
channels	channels	rgb	The color correction is only applied to these channels. You can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** 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. If you are using unpremultiplied input images, you should leave this set to **none**.
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

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 **vectorfield file**.

Control (UI)	Knob (Scripting)	Default Value	Function
file type	file_type	auto	The file format of the LUT file to apply. The following file extensions are recognized: • **auto** - Nuke attempts to guess the file type from the **vectorfield file**'s extension. • **.3dl** - Autodesk and ASSIMILATE Scratch LUT format (3D). • **.blut** - Side Effects Houdini binary LUT format (3D). • **.cms** - Light Illusion LightSpace CMS LUT format (1D and 3D). • **.csp** - Rising Sun Research CineSpace LUT format (3D). • **.cub** - FilmLight Truelight LUT format (1D and 3D). • **.cube** - IRIDAS LUT format (1D and 3D). • **.vf** - Nuke's native LUT format used by the Vectorfield node (3D). • **.vfz** - Gzip compressed .vf files.

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 (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.

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interpolation	interpolation	trilinear field	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: • **step field** - 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. • **linear staggered vector field** - Instead of having the

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **trilinear field** - This is a smooth quasilinear interpolation between the nearest voxel neighbors to the queried point. • **cubic field** - This option is like **trilinear field** but uses a larger stencil and tries to interpolate more smoothly between values using cubic interpolation.
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	Determines how to convert from Nuke's linear colorspace to the input required by the 3D LUT: • linear • sRGB • rec709 • Cineon • Gamma 1.8 • Gamma 2.2 • PanaLog • REDLog • ViperLog • AlexaV3LogC • PLogLin • SLog • REDSpace

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	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. • **auto** - 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. • **inputbitdepth -** use the input bit depth. • **4 bit** - use a 4 bit depth. • **8 bit** - use an 8 bit depth. • **10 bit** - use a 10 bit depth. • **12 bit** - use a 12 bit depth. • **16 bit** - use a 16 bit depth.
normalize output	normalize_ output	disabled	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.
3dl file format	format_3dl_id	auto	Select the format you want to use for your .3dl file. • **auto** - 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. • **autodesk flame/smoke** - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65. • **autodesk lustre** - use Autodesk preferred cube sizes of 17x17, 33x33, and 65x65, and output a

Control (UI)	Knob (Scripting)	Default Value	Function
			3DMESH/Mesh header. • **assimilate scratch** - scale and offset the 3D LUT. This should be used only for legacy scratch files prior to Flame compatibility.

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	An optional image to compute color similarity while filtering. Connecting the **guide** 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 **guide** images have the same format, the node acts as a cross bilateral filter. If the **guide** input is not connected, the output format is equal to that of the source input and acts as a standard bilateral filter.
	mask	An optional image to use as a mask. By default, the filter effect 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 **mask** control is disabled or set to **none**.
	unnamed	The image sequence to filter.

Control (UI)	Knob (Scripting)	Default Value	Function
Bilateral Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
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 **all** or **none**, you can use the checkboxes on the right to select individual channels.
Guide Channels	guide	all	When the **guide** input is connected, sets the channels in the guide image used to compute the filtering weights. The guide image should contain some prior information on the source useful to the filtering, such as a **depth** channel. If no information is available, the result of an unguided C_Bilateral filter can be used as **guide** input of a second filtering operation.
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	Sets the type of color weighting applied to the output: • **guassian** - weighted to differences in the surrounding pixel color and how close those pixels are to one another. • **median** - weighted according to the middle value pixel.
Mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a**

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. 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	An optional image to use as a mask. By default, the blur effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Blur Tab			
channels	channels	all	The blur effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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	Select the filter algorithm to use: • box • triangle • quadratic • gaussian **Note:** Box blur is the fastest to render, whereas Gaussian blur is the smoothest.

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. 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	An optional input to use as a mask. By default, the effect is limited to the non-black areas of the mask. 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 **Default Matte Channel** control is disabled or set to **none**.
	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 **Kernel Type** is set to **Input** 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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Depth Channel	depthChannel	depth.Z	Specifies the input channel containing the depth map information. **Note:** You can defocus an image without using any additional depth data, but the result is uniformly defocused by the **Multiplier** control.

Output Type	outputType	Defocused Image	Sets the output type:
			• **Defocused Image** - displays the input image with the Bokeh effects applied.
			• **Lens Bloom** - displays just the bloom effect.
			• **Focal Distance Visualization** - preview the focal distance values. This option displays where your focus plane is located in the image:
			  • **Red** - the focal plane, where your image is fully in focus.
			  • **Green** - areas of the image in front of the focal plane.
			  • **Blue** - areas of the image behind the focal plane.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: Increasing the **Focus Region Size** can help differentiate between regions. • **Filter Shape** - preview the shape of the kernel. • **Focus Mattes** - Front/Back mattes for the focus.
Focus Region Output	focusOutput	Both	Sets whether the **Front**, **Back**, or **Both** focus regions are output to the Viewer. 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.
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 **Multiplier** control.
Back Multiplier	backmultiplier	1	Sets the amount of defocus applied to the back focus region in addition to the defocus applied by the **Multiplier** control.
Depth Style	depthStyle	Real	Controls how the depth information is interpreted: • **Real** - uses real world values to calculate the defocus. • **1/z** - uses values similar to those

Control (UI)	Knob (Scripting)	Default Value	Function
			output by ScanlineRender nodes to calculate the defocus. **Note:** If you're using deep data, this control has no effect.
Focal Plane	focalPlane	100	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. **Note:** Set the **Output Type** to **Focal Distance Visualization** to see a representation of the focal plane in red and the front and back regions in green and blue.
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 **none**.
	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 **Output Type** is set to **Focal Distance Visualization**, 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 **Lens** controls to match your physical lens characteristics, such as **Focal Length** and **Aperture**. When disabled, the **Lens** 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 **cm**.
World Scale Multiplier	worldScaleMultiplier	1	Sets the multiplier applied to the **World Scale**. For example, if your

Control (UI)	Knob (Scripting)	Default Value	Function
			scene units are based on 10 cm blocks, you can set the **World Scale** to **cm** and the **World Scale Multiplier** to **10** to adjust the scene accordingly.
Film Format	filmFormat	35mm	Sets the filmback to use from a list of preset values, which automatically sets the **Aperture Width** and **Aperture Height** for the selected filmback. If you want to set the aperture manually, set **Film Format** to **Custom** and then enter the required aperture dimensions in mm.
Aperture Width	apertureWidth	22	**Aperture Width** and **Aperture Height** are controlled by the selected **Film Format**.
Aperture Height	apertureHeight	16	If you want to set the aperture manually, set **Film Format** to **Custom** and then enter the required aperture dimensions in mm.
Optical Artifacts Tab			
Bloom	bloom	0	Controls the brightness of any bloom applied to the image when the **Bloom Threshold** is reached. Any pixels with a brightness less than the **Bloom Threshold** are not affected.
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 **Bloom** control.

Control (UI)	Knob (Scripting)	Default Value	Function
			Any pixels with a brightness less than the **Bloom Threshold** 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 **none**.
	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	Defines the spherical aberration in the physical lens, which affects the bloom shape differently depending on the amount of aberration in the lens. Negative **Spherical Aberration** values make the kernels brighter in the center and positive values make the kernels brighter on the edges.
Chromic 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.
Chromic 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.
Chromic 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 **none**.
	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	Controls the shape of the bloom kernel to apply to the image: • **Input** - a custom shape defined by the nodes attached to the **Kernel** input. • **Circular** - a clean, round lens shape that produces a round bloom effect. • **Aperture Blades** - 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 **Blades Count** control. **Tip:** You can preview the shape of the kernel by changing the **Output Type** to **Filter Shape** on the **Bokeh** tab.
Maximum Kernel Size	max_kernelsize	256	Sets an upper limit on the size of the kernel. You can reduce this size value to decrease processing time, but any defocus result is then clamped.
Expand Bounding Box To Max Kernel Size	expandBBoxToMaxKernelSize	off	When enabled, the bounding box is increased to accommodate the kernel size if the kernel extends beyond the bounding box. When disabled, the parts of the kernel

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 **none**.
	missingKernelChannel	none	The channel to use if an expected kernel channel is missing from the **Kernel** input. This channel has no effect on the **Circular** and **Aperture Blades** presets.
Aspect Ratio	kAspectRatio	1	Determines the aspect ratio of the kernel. If you're defocusing anamorphic images, set the kernel **Aspect Ratio** 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 **Kernel Type** is set to **Aperture Blades**, 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	Controls the curvature of the blades in the kernel shape. Lower values produce sharper angles on the kernel shape and higher values smooth the kernel shape.
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	Sets the number of slices the depth channel is divided into during defocus calculations, which can help avoid objects at different depths overlapping incorrectly. The depth volume sliced is defined by the **Focal Plane** and **Focus Region Size**. • **1 slice** - the image is defocused in one pass, which can result in overlapping. • **2 slices** - the front and back regions are processed separately so that objects in the foreground are distinct from objects in the background. • **3+ slices** - divide the depth channel into this number of equal slices and process each one separately.
Override Near/Far	overrideNearAndFarForSlices	off	When enabled, you can override the depth slice volume defined by the **Focal Plane** and **Focus Region Size** using the **Near and Far** controls.
Near and Far	depthSlicesNearAndFar	0, 0	When **Override Near/Far** is enabled, use these controls to define the depth volume to separate into slices. The number of slices is defined by the **Number of Corrective Slices** control.

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	An optional image to use as a mask. By default, the filter effect 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 **mask** control is disabled or set to **none**.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			the emboss. **Note:** You can also move the **lightposition** indicator manually.
Bump Size	bumpsize	1	Sets the size of the emboss applied to the image connected to input **B**.
Light Height	height	1	Controls the height of the **lightposition** indicator, where zero is level with the image, producing no emboss. **Note:** Negative values position the light 'behind' the image.
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	Sets the coordinates of the **center** indicator in the Viewer. The position of the **lightposition** indicator in relation to this indicator controls the shadow applied to the emboss. **Note:** You can also move the **center** indicator manually.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a**

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. 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.

Convolve

Convolve 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. 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	An optional image to use as a mask. By default, the filter effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Convolve Tab			
channels	channels	all	The filter effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
filter channel	filter_channel	rgba.alpha	The channel to use as the convolution matrix from the **filter** input. This control is only available if **use input channels** is disabled.
use input channels	use_input_channels	disabled	When enabled, Convolve uses the same channels from the **filter** input as the **image** input (that is, whatever **channels** is set to).
filter bounds	filter_bounds	shape	Sets what to use as the filter bounds: • **shape** - The **filter** 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 **filter** input is a roto shape with a small bounding box that doesn't fill the entire format area, for example.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **format** - The **filter** input's format. In this case, Convolve uses the entire format area, allowing you to offset the filter image within the format.
normalize	normalize	enabled	When enabled, the **filter** 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 **none**.
	maskChannelInput	none	The channel to use as a mask. By default, the filter effect is limited to the non-black areas of this channel. For example, you can use a depth channel here to simulate depth-of-field blurring.
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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 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. If you set this to something other than **all** or **none**, 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	Sets the mode of operation: • **accelerated** - faster than **fullprecision** mode, especially for large defocus disks. • **fullprecision** - delivers perfect defocus at the cost of performance. **Note:** Accelerated mode may generate speckles in horizontal lines due to imprecisions in the computer math. Normally, those speckles are invisible to the eye (delta < 0.00001), but they can cause artifacts in nodes that use comparison math (that is, if (src.red==0) ...). You can use **fullprecision** to avoid this speckling, but there is a significant render time increase.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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 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 degrain.
	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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
DegrainSimple Tab			
channels	channels	all	The channels to degrain. If you set this to something other than **all**, **rgba**, or **rgb**, the **R blur**, **G blur**, and **B blur** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. 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 **Noise** 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	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more

Control (UI)	Knob (Scripting)	Default Value	Function
			information on the GPUs supported by your operating system.
Source	type	Digital	Choose **Film** or **Digital** according to what type of footage you're working with.
Noise Model	model	Modulated	Choose what type of noise you're dealing with: • **Constant** - 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. • **Modulated** - for most cases, this is a good option.
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: • **Constant** - let Denoise look at the analysis region and remove the same amount of noise across all intensities. **Constant** is nearly always a good choice, but if you find that your denoise results are too smooth and adjusting **DenoiseAmount** and **RollOff** doesn't help, you should try setting this to **Automatic**. • **Automatic** - let Denoise estimate a noise profile automatically based on the entire **ProfileFrame**. This way, Denoise removes different amounts of noise from the shadow, midtone, and highlight areas of the **Source** 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 **Profile Frame** on the **Profile** tab to that frame and click the **Recalculate Profile** button.

Control (UI)	Knob (Scripting)	Default Value	Function
			Denoise always bases the noise profile on your **Source** footage, even if you've attached another clip to the **Noise** input. You can use the **TuneProfile** controls to tweak both **Constant** and **Automatic** profiles.
Output	output	Result	Whether to output the denoised image or the noise that was removed: • **Result** - output the denoised **Source** image. • **Noise** - output the noise that was removed from the **Source** 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.
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	Sets the smoothness of the denoise thresholding. A value of 1 equals hard thresholding. Any other value produces soft thresholding between the **Denoise Amount** and the **Roll Off** multiplied by **Denoise Amount**.
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 **Denoise Amount**.
Luminance Blend	lumablend	0.7	Blends the denoised luminance with the image's original luminance, bringing back some of the image detail in the result. 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.
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	When enabled, uses frames either side of the current frame to perform temporal frame blending, which may produce a better denoise result. **Note:** The **Motion** input must be connected to enable **Temporal Processing**. The number of frames used either side of the current frame is determined by the **Temporal Frame Offset** control. When disabled, uses only the current frame to produce the denoise result.
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
			Note: This control is only available when **Temporal Processing** 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. **Note:** This control is only available when **Temporal Processing** is enabled.
Noise Analysis			
Lock Noise Analysis	lockNoiseAnalysis	disabled	When enabled, no analysis is performed. This is activated by default if you use the **Import** 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. You can adjust the following: • **x** - the distance (in pixels) between the left edge of the image and the left side of the analysis box. • **y** - the distance (in pixels) between the bottom edge of the image and the bottom edge of the analysis box. • **r** - the distance (in pixels) between the left edge of the image and the right side of the analysis box. • **t** - the distance (in pixels) between the bottom edge of the image and the top edge of the analysis box. • **w** - the width of the analysis box. This is only available if you click the **wh** button. • **h** - the height of the analysis box. This is only available if you click the **wh** button. You can also use the analysis box in the Viewer to

Control (UI)	Knob (Scripting)	Default Value	Function
			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. By default, whenever the analysis box is altered, the internal analysis of the noise in that region reoccurs.
Analysis Frame	analysisFrame	1	The frame at which to analyze the noise in the analysis region. This field is automatically updated if you scrub to a new frame in the Viewer and reposition the analysis box.
Analyze Noise	analyze	N/A	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.
Analysis File	analysisFile	N/A	The name and location of an external analysis file. Click the **Export** button to save the analysis profile in this file, or **Import** to read the analysis profile from this file. The analysis file can be any binary file - for example a plain text file (.txt).

Control (UI)	Knob (Scripting)	Default Value	Function
Import	import	N/A	Reads an analysis profile from an external analysis file (specified in **Analysis File**). This disables any controls that are read from the analysis file. To re-enable them, you can uncheck **Lock Noise Analysis**.
Export	export	N/A	Saves an analysis profile to an external analysis file (specified in **Analysis File**). **Note:** If you've set **Profile** to **Constant**, only the controls that affect the analysis are saved in this file. By contrast, if you've set **Profile** to **Automatic**, both the analysis profile and the automatically calculated noise profile are exported.
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. 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. 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			frequencies (coarse detail). Normally, most of the noise occurs in the high and medium frequencies, so often you can disable the low frequency altogether.
Low Gain	lowAmount	1	Scales the threshold for low noise removal. 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.
Process Very Low Frequencies	processVeryLow	disabled	Enable this if you want to remove noise from very low frequencies (very coarse detail). Normally, most of the noise occurs in the high and medium frequencies, so often you can disable the very low frequency altogether.
Very Low Gain	veryLowAmount	1	Scales the threshold for very low noise removal. 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.
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
			on the right. The y axis represents the relative amount of noise removed. You can adjust the curve manually by dragging the points on the curve to a new location. To add more points to the curve, **Ctrl**/**Cmd**+**Alt**+click on the curve. If you are not happy with your changes, click **Reset Profile** to reset the curve to its original shape.
reset	N/A	N/A	Resets any changes you've made to the noise curve. This does not affect changes made using the **Low Gain**, **Mid Gain**, and **High Gain** controls. This button has the same functionality as the **Reset Profile** button below.
Tune Profile	tuneProfile	disabled	Enable this to tune the noise profile by adjusting **Low Gain**, **Mid Gain**, or **High Gain**. This works in both the **Constant** and **Automatic** profiling mode.
Low Gain	lowGain	1	Scales the denoising threshold in the low light areas of the **Source** image. For example, a value of **2** multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept. This control is only available when **Tune Profile** is enabled.
Mid Gain	midGain	1	Scales the denoising threshold in the midtone areas of the **Source** image. For example, a value of **2** multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept. This control is only available when **Tune Profile** is enabled.

Control (UI)	Knob (Scripting)	Default Value	Function
High Gain	highGain	1	Scales the denoising threshold in the highlight areas of the **Source** image. For example, a value of **2** multiplies the threshold by 2. Everything below the threshold is considered noise and removed, while everything above the threshold is kept. This control is only available when **Tune Profile** is enabled.
Profile Frame	profileFrame	1	The frame at which to estimate the noise profile when **Profile** is set to **Automatic**. 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 **Recalculate Profile**.
Recalculate Profile	reprofile	N/A	If you've set **Profile** to **Automatic**, 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.

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	An optional image to use as a mask. By default, the blur effect 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 **mask** control is disabled or set to **none**.

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 **all** and select the channels you want to blur using **BlurLayer**.
BlurType	BlurType	zoom	Select the blur type to apply: • **zoom** - 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. • **radial** - smears pixels around a center point. You can use this to simulate motion blur on a rotating object. • **linear** - smears pixels in a given direction. You can use this to simulate motion blur on a moving object.
BlurLayer	BlurLayer	rgb	The blur effect is only applied to these channels. This control works together with the **channels** control. For a channel to be blurred, it needs to be selected from both the **channels** and the **BlurLayer** dropdown menu. You can use the checkboxes on the right to select

Control (UI)	Knob (Scripting)	Default Value	Function
			individual channels.
Holdout Channel	N/A	disabled	Enables the associated holdout channel to the right. Disabling this checkbox is the same as setting the channel to **none**. This control only has an effect when **BlurType** is set to **zoom**.
	holdout	none	Pixels corresponding to non-black pixels in the holdout channel are NOT averaged into the final pixel value. This control only has an effect when **BlurType** is set to **zoom**.
BlurCenter xy	BlurCenter	320, 240	Sets the blur origin or center on the xy axes, or drag the **BlurCenter** handle in the Viewer. When using **linear** blur, **BlurCenter** only has an effect if **UseTarget** is enabled.
BlurLength	BlurLength	5	The length (in pixels) of the blur applied. When using **zoom** blur, negative values reverse the blur direction.
BlurAngle	BlurAngle	45	Determines the direction of **linear** blur when **UseTarget** is disabled.
Linear Target xy	target	480, 240	When using **linear** blur with **UseTarget** enabled, a vector is created between this and **BlurCenter**. This vector then determines the direction of linear blur. You can also adjust **Linear Target** by dragging the **target** handle in the Viewer.
UseTarget	UseTarget	disabled	When enabled, the direction of **linear** blur is determined by a vector between **BlurCenter** and **Blur**

Control (UI)	Knob (Scripting)	Default Value	Function
			Target. If this is disabled, the direction of **linear** blur is determined by **Blur Angle**.
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 **BlurType** is set to **zoom**, 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 **none**.
	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 **mask** input to the predefined **mask.a** 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.

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 **color** control. When disabled, the shadow color is determined by the **color** control.
color	color	0, 0, 0	When **inherit input color** 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	Sets the merge operation used when comping the input over the background. See Nuke's online help for more information.

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	An optional image to use as a mask. By default, the blur effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
EdgeBlur Tab			
channels	channels	all	The blur effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
matte input	N/A	enabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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	Select the filter algorithm to use: • box • triangle • quadratic • gaussian **Note:** Box is the fastest to render, whereas Gaussian blur is the smoothest.
quality	quality	15	Sets the quality of the applied filter. Lower values produce faster renders at the expense of smoothness, and vice-versa. **Note:** The image is scaled down so the blur filter is no larger than this number, and then scaled up using linear interpolation after filtering.
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 **none**.
	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 **none**.
	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 **mask** input to the predefined **mask.a** 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: • simple • sobel • prewitt
channels	channels	all	The effect is only applied to these channels. If you set this to something other than **all** or **none**, 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 **none**.
	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 **none**.

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	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more

Control (UI)	Knob (Scripting)	Default Value	Function
			information on the GPUs supported by your operating system.
Channels	channels	rgb	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Matte	matte	Source Alpha	Where the foreground matte is taken from to limit the effect when eroding or dilating the edges: • **None** - do not use a matte. • **Source Alpha** - use the alpha of the Source input. • **Source Inverted Alpha** - use the inverted alpha of the Source input. • **Matte Luminance** - use the luminance of the Matte input. • **Matte Inverted Luminance** - use the inverted luminance of the Matte input. • **Matte Alpha** - use the alpha of the Matte input. • **Matte Inverted Alpha** - use the inverted alpha of the Matte input.
Source Is Premultiplied	sourceIsPremultiplied	disabled	When enabled, EdgeExtend assumes that the image connected to the **Source** input is premultiplied. When disabled, no premultiplication is assumed.
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. 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	An optional image to use as a mask. By default, the blur effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Emboss Tab			
channels	channels	all	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Emboss Type	optype	traditional	Sets the type of emboss output you want: • **traditional** - applies the emboss effect to the input image. • **effect** - outputs the effect only, making it easy for you to composite with other footage.
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 **none**.
	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	Choose an edge detection method: • simple • sobel • prewitt
edgechannels	edgechannels	rgb	The edge detection is only applied to these channels. If you set this to something other than **all** or **none**, 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

Control (UI)	Knob (Scripting)	Default Value	Function
			channel to **none**.
	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 **none**.
	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 **none**.
	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 **mask** input to the predefined **mask.a** 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

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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.

Control (UI)	Knob (Scripting)	Default Value	Function
size	size	-1	Adjusts the size of pixels within the channel defined by the **channels** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
size	size	0	Adjusts the size of pixels within the channel defined by the **channels** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
size	size	1	Adjusts the size of pixels within the channel defined by the **channels** control. Values less than 1 increase the light pixels and vice versa.
filter	filter	box	Select the filter algorithm to use: • box • triangle • quadratic • gaussian

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	The effect is only applied to these channels. If you set this to something other than **none**, you can use the checkboxes on the right to select individual channels.
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 **channels** control. Values less than 15 increase the dark pixels and vice versa.
filter	filter	gaussian	Sets the filter algorithm to use: • box • triangle

Control (UI)	Knob (Scripting)	Default Value	Function
			• quadratic • gaussian **Note:** Box is the fastest to render, whereas Gaussian blur is the smoothest.
n/a	quality	15	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. **Note:** Lower quality values process more quickly, but the result is not as smooth.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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.

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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select

Control (UI)	Knob (Scripting)	Default Value	Function
			individual channels.
translate xy	translate	0,0	Sets the position of the **translate** widget in the Viewer which controls the direction of the rays or blur. Straight-line motion blur can be simulated by positioning the translate widget along the direction of motion.
rotate	rotate	0	Controls the direction of rotational rays or blur in relation to the **center** widget. Negative values produce clockwise rotation and vice versa. You can also use this in conjunction with the **scale** control to create spirals.
scale	scale	1	Controls the direction of zoom in relation to the **center** widget. Values less than one zoom out and vice versa. You can also use this in conjunction with the **rotate** control to create spirals.
skew	skew	0	Controls the direction of skew in relation to the **center** widget
center	center	1024, 778	Sets the coordinates for the **center** widget in the Viewer. This is the center for **rotation**, **scale**, and **skew**.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU**

Control (UI)	Knob (Scripting)	Default Value	Function
available			specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Channels	channels	rgb	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Fill Region	fillRegion	Source Alpha	Sets the Matte channel used to inpaint the **Fill Region**. Source pixels are sampled from outside this region and extended into the **Fill Region**. • **None** - do not use a matte. • **Source Alpha** - use the alpha of the Source input. • **Source Inverted Alpha** - use the inverted alpha of the Source input. • **Matte Luminance** - use the luminance of the Matte input. • **Matte Inverted Luminance** - use the inverted luminance of the Matte input. • **Matte Alpha** - use the alpha of the Matte input. • **Matte Inverted Alpha** - use the inverted alpha of the Matte input.

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 **Direction** control.
Direction	stretchDirection	0	Sets the direction of stretch in degrees when **Amount** 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 **Source** input or the **Detail** 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. 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 **Detail** input is a different format to the **Source** input, you might not get the results you expect, but you can use the **Detail Center** to correct the offset of the Viewer widget.
Rotate	rotate	0	Sets the rotation of the detail recovered, in degrees, relative to the **Detail Center** controls. Adjusting the **Detail Center** changes the relative rotation.

Control (UI)	Knob (Scripting)	Default Value	Function
Scale	scale	1	Sets the scale of the detail recovered relative to the **Detail Center** controls. Adjusting the **Detail Center** changes the relative scale.
Center	center	dependent on input format or compositing environment **Project Settings**	Sets the center of the detail so that changes to the translation, rotation, and scale are relative to the **Detail Center**. This control defaults to the center of the **Source** format or the **Project Settings** > **full size format** control if no **Source** is connected.

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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select

Control (UI)	Knob (Scripting)	Default Value	Function
			individual channels.
size	size	3	Adjusts the size of pixels within the channel defined by the **channels** control. Values less than 3 increase the light pixels and vice versa.
filter	filter	gaussian	Sets the filter algorithm to use: • box • triangle • quadratic • gaussian **Note:** Box is the fastest to render, whereas Gaussian blur is the smoothest.
n/a	quailty	15	Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth. 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.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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 **none**.
	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	If the **creatematte** button is turned on and **extrapolatechannels** is set to something other than **none**, the colors at the edge of the original matte are extrapolated as the matte is expanded. Unless **gradientextrapolate** is enabled, this function simply copy uses the color of the closest edge pixel.
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,

$$\begin{matrix} -1 & -1 & -1 \\ -1 & 8 & -1 \end{matrix}$$

-1 -1 -1

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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.

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 **mask** input to the predefined **mask.a** 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.

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	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
size	size	3	Defines the filter area, in pixels, to apply the median across.
ignore top line	ignore_top_line	disabled	When enabled, the top line of pixels is ignored within the filter box to account for different area calculation methods. **Note:** Enable this control for backward compatibility to pre 6.2v1 versions of Nuke.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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.

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. 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 **Matte** input. If you have a single set of vectors, you should connect it to the **FgVecs** input.
	BgVecs	
	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 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 **Use GPU if available** is enabled. Local GPU displays **Not available** when:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Shutter Samples	shutterSamples	3	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.

Control (UI)	Knob (Scripting)	Default Value	Function
Shutter Time	shutterTime	0.75	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. Imagine a gray rectangle moving left to right horizontally across the screen. The figures below show how **Shutter Time** affects the retimed rectangle.
Method	motionEstimation	Dependent on script	Sets the method of calculating motion estimation vectors: • **Local** - uses local block matching to estimate motion vectors. This method is faster to process, but can lead to artifacts in the output. • **Regularized** - uses semi-global motion estimation to produce more consistent vectors between regions.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Scripts loaded from previous versions of Nuke default to **Local** motion estimation for backward compatibility. Adding a new MotionBlur node to the Node Graph defaults the **Method** to **Regularized** motion estimation.
Vector Detail	vectorDetail	0.2	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. A value of 1 generates a vector at each pixel, whereas a value of 0.5 generates a vector at every other pixel.
Resampling	resampleType	Bilinear	Sets the type of resampling applied when retiming: • **Bilinear** - the default filter. Faster to process, but can produce poor results at higher zoom levels. You can use **Bilinear** to preview a motion blur before using one of the other resampling types to produce your output. • **Lanczos4** and **Lanczos6** - these filters are good for scaling down, and provide some image sharpening, but take longer to process.
Matte Channel	matteChannel	None	Where to get the (optional) foreground mask to use for motion estimation: • **None** - do not use a matte. • **Source Alpha** - use the alpha of the **Source** input. • **Source Inverted Alpha** - use the inverted alpha of the **Source** input. • **Matte Luminance** - use the luminance of the **Matte** input. • **Matte Inverted Luminance** - use the inverted luminance of the **Matte** input. • **Matte Alpha** - use the alpha of the **Matte** input. • **Matte Inverted Alpha** - use the inverted alpha of the **Matte** input.

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 **2D transf** 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: • **centred** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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 **cam** 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 **none**.
	Z	none	The channel to use for Z depth information.
distance	distance	1	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 **distance** to **inf** to use rotations only. **Note:** If a Z input channel is provided, **distance** is a multiplier for the distance.
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: • **centred** - center the shutter around the current frame. For example, if you set the shutter value to 1

Control (UI)	Knob (Scripting)	Default Value	Function
			and your current frame is 30, the shutter stays open from frame 29,5 to 30,5. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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.

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	An optional image to use as a mask. By default, the blur 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Sharpen Tab			
channels	channels	none	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
minimum	minimum	0	
maximum	maximum	1	
amount	amount	1	
size	size	1	Adjusts the size of pixels within the channel defined by the **channels** control. Values less than 3 increase the light pixels and vice versa.
filter	filter	gaussian	Sets the filter algorithm to use: • box • triangle • quadratic • gaussian

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Box is the fastest to render, whereas Gaussian blur is the smoothest.
n/a	quailty	15	Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth. 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.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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.

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	An optional image to use as a mask. By default, the blur 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Soften Tab			
channels	channels	none	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **channels** control. Values less than 3 increase the light pixels and vice versa.
filter	filter	gaussian	Sets the filter algorithm to use: • box • triangle • quadratic • gaussian **Note:** Box is the fastest to render, whereas gaussian blur is the smoothest.
n/a	quailty	15	Controls the level of filtering quality. Entering a low number runs the calculation more quickly, but the end result isn't quite as smooth. 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.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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	An optional image to use as a mask. By default, the blur 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
VectorBlur Tab			
channels	channels	none	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
uv channels	uv	none	Sets the channel(s) to control the horizontal (u) and vertical (v) size of the blur vector. **Note:** If the **uv** values are read from a file, enable the Read node's colorspace **raw data** checkbox. See Read.
mv presets	mv_presets	Nuke Scanline Render	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. For example, if VectorBlur is downstream of a PRMan node, select PRMan from the dropdown.
vector preprocessing			

Control (UI)	Knob (Scripting)	Default Value	Function
output	output	result	Sets the output of the VectorBlur node: • **result** - the final result of the blur is displayed in the Viewer. • **uvs** - the uv map used to generate the motion vectors.
blur uv	blur_uv	none	When set to **uniform** or **linear**, applies the motion blur filter to the motion vectors themselves, before using them to blur the image. This option can smooth out gradients in the motion vectors, resulting in a softer blur between regions with very different motion. • **none** - don't blur the UVs. • **uniform** - apply a small uniform blur to soften edges in the UV map. This is how blur was calculated pre-Nuke 10. • **linear** - apply a linearly-weighted blur to blend between regions with different motion. This has a stronger effect than the **uniform** option.
invert uv	invert_uv	disabled	When enabled, invert the motion vectors before blurring them. **Note:** 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).
uv offset	uv_offset	0	Sets a constant value to add to the **uv channels** values. **Note:** If the **uv** values are read from a file, this should be -0.5 or -127/255.

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 **none**.
	alpha	none	If your motion vectors were premultiplied, set this channel to the channel used to multiply the vectors to improve the results. **Tip:** Where possible, use vectors that have not been premultiplied.
motion blur			
blur type	blur_type	gaussian	Sets the profile to use along the direction of blur: • **uniform** - a box-like profile with uniform weighting along the blur vector. • **gaussian** - a gaussian profile with a softer fall-off towards the ends of the blur vector.
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 **frame** +/- **motion offset**.
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	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. Normalizing can exacerbate the effects of tearing and collisions, but it tends to give a softer blur than not normalizing.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	maskChannelInput	none	The channel to use as the alpha channel.
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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	An optional image to use as a mask. By default, the effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
User Tab			
Volumetric Creation	style	RGB Luminance	Sets the style of rays to create, dependent on the available input channels: • **RGB Luminance** - creates rays based on the input image luminance. • **Alpha Edges** - 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. • **Alpha Solid** - creates rays based on the input image's entire alpha. • **Shadow Making** - creates rays using the input image's alpha to cast shadows.
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 **vol_pos** 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: • Low • Medium • High • Very High **Note:** Higher quality rays take longer to render.
Add on Top	comp_me	disabled	When enabled, the effect overlay and the input image are passed from the node. When disabled, only the effect is passed from the node for compositing purposes.
Flicker Options			
Use Flickering	chk_flicker	enabled	When enabled, the **Flicker Options** 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. **Note:** If **Transform Noise with Volume Center** is enabled, this control has no effect on the rays.
Transform Noise with Volume Center	xform_flicker	disabled	When enabled, flicker noise moves with the **vol_pos** widget so that flickering is the result of the **FlickerSpeed** only. When disabled, flicker is artificially generated using the **Flicker Size** 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 **Radial Falloff** 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
			vol_pos 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 **Mask** input is used as a mask. **Note:** The mask must contain an alpha channel.
Mask Blur	mask_blur	0	Adjusts the blur applied to the edges of the mask.
Transform Mask with Volume Center	chk_xform_mask	disabled	When enabled, the mask and **vol_pos** widget's relative positions are maintained - any transform applied to the **vol_pos** widget is applied to the mask. When disabled, the mask is not transformed by **vol_pos** widget.

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	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 **image** input is blurred, any out-of-focus highlights ('bokeh') in the clip assume the shape of the **filter** image. You can create a filter image using the Roto node (**Draw** > **Roto**) or the Flare node (**Draw** > **Flare**), 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. 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.
	image	The image sequence to receive the blur effect. This should also contain the depth map channel.
	mask	An optional image to use as a mask. By default, the blur 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ZDefocus Tab			
channels	channels	all	The effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select

Control (UI)	Knob (Scripting)	Default Value	Function
			individual channels.
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
depth	z_channel	depth.Z	Specifies the input channel containing the depth map

Control (UI)	Knob (Scripting)	Default Value	Function
channel			information. **Note:** 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.
math	math	depth	Specifies how the **depthchannel** 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: • **direct** - The **Z** value in the **depth channel** directly controls blur. For example, if **Z** is 0.5, then the blur size will be 0.5 times the value of the **size** control (unless this is bigger than **maximum**, in which case it will be clamped to **maximum**). • **depth** - The **Z** value in the **depth channel** is the distance between the camera and whatever is in the image at that pixel. • **far = 0** - The **Z** value in the **depth channel** 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. • **far = 1** - Near plane = 0, far plane = 1. This is compatible with depth maps generated by OpenGL. • **-direct** - As with the **direct** mode, the Z value in the **depth channel** directly controls blur. In other words, each layer is blurred by the same amount as in the **direct** mode. However, in this mode, the layers are

Control (UI)	Knob (Scripting)	Default Value	Function
			interpreted as being in the opposite order, so a higher depth value places a layer in front of another rather than behind it. • **-depth** - The **Z** value in the **depth channel** is -distance in front of the camera. This is the same as **depth**, but the distances are negative to start with. • **far = -0** - The **Z** value in the **depth channel** 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. • **far = -1** - Near plane = 0, far plane = -1.

output	output	result	Sets the output type:
			• **result** - displays the input image and the result of the blur controls.
			• **focal plane setup** - displays depth-of-field (DOF) information in the **rgb** channels:
			  • **red** - Less than DOF (in front of the area that's in focus).
			  • **green** - Inside DOF (in focus). Note that if **depth of field** is set to **0**, nothing is displayed in green.
			  • **blue** - Greater than DOF (behind the area that's in focus).
			• **layer setup** - like focal plane setup, but displays depth-of-field (DOF) information after the depth has

Control (UI)	Knob (Scripting)	Default Value	Function
			been divided into layers. Pixels assigned to the same layer have the same amount of blur applied to them. • **filter shape setup** - displays the filter shape in **rbg**, allowing you to adjust the filter more accurately.
show image	show_image	enabled	When **output** is set to **focal plane setup**, enabling this shows the depth-of-field (DOF) information overlaid upon the input image.
fill foreground	fill_foreground	enabled	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. 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 **fill foreground** 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.
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 **focal point** widget in the Viewer. Adjusting the Viewer widget updates the **focusplane** and **focalpoint** fields automatically.

Control (UI)	Knob (Scripting)	Default Value	Function
depth of field	dof	0	Sets a depth slice around the focus plane that is entirely in focus. **Note:** True theoretical depth of field would set this to zero.
blur inside	blur_dof	enabled	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.
size	size	25	Sets the size of the blur at infinite depth. Blur nearer the camera than the focus plane may be larger. If you have set **math** to **direct**, the size is multiplied by the depth to give the blur size at that depth. Setting **size** to 1 allows you to use the values in the depth map as the blur size directly.
maximum	max_size	50	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. Set this value as low as possible for maximum processing speed.
automatic layer spacing	autoLayerSpacing	enabled	When enabled, ZDefocus automatically works out how many depth layers to use, based on the maximum blur size (**maximum**). 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. When disabled, you can control the depth layers and their spacing manually using **depth layers** and **layer curve**.

Control (UI)	Knob (Scripting)	Default Value	Function
depth layers	nLayers	20	The number of depth layers to use for the blur. Use a small number of layers for maximum speed. The maximum number of blur sizes that are used between 0 and **maximum** 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.
layer curve	layerCurve	1	The curve to apply to the layer spacing. 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 **maximum** blur size.
filter type	filter_type	disc	Sets the blur filter applied to the image: • **disc** - applies a round disc filter to the image. • **bladed** - applies a bladed filter to the image (simulates the iris blades that can make up a camera's diaphragm). • **image** - uses the image in the **filter** input as the blur kernel.
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	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. This allows you to simulate the cat's eye effect, caused by vignetting inherent within some lens designs.
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
			values larger than 1 squeeze it on the y axis. This allows you to simulate the cat's eye effect, caused by vignetting inherent within some lens designs.
blades	blades	5	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. **Note:** This field only accepts integers larger than 1.
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 **catadioptric** is enabled, controls the size of the catadioptric hole in the filter.
catadioptric	catadioptric	disabled	When enabled, ZDefocus simulates catadioptric lenses. This means the defocused areas of the image are annular, producing donut-shaped bokeh. You can use the **catadioptric size** to control the hole in the center of the filter.

Control (UI)	Knob (Scripting)	Default Value	Function
The following controls, up to and including **clamp image filter**, are only available when **filter type** is set to **image**.			
legacy resize mode	legacy_resize_mode	N/A	Loading scripts from pre-Nuke 8.0v7 enables the **legacy resize mode** checkbox automatically, for backward compatibilty, and uses the **filter bounds** dropdown to determine how images used in filtering are resized. Adding new ZDefocus nodes hides the **legacy resize mode** checkbox and allows you to use the **image filter** dropdown to give you more flexibility when calculating blur.
filter channel	filter_channel	rgba.alpha	The channel to use as the convolution matrix from the **filter** input. This control is only available if **use input channels** is disabled.
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	Sets what to use as the filter bounds when **legacy resize mode** is enabled: • **shape** - The **filter** 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 **filter** input is a roto shape with a small bounding box that doesn't fill the entire format area, for example. • **format** - The **filter** input's format. In this case, ZDefocus uses the entire format area, allowing you to offset the filter image within the format.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **legacy resize mode** is enabled.
image filter	image_filter	Cubic	Sets which of Nuke's filtering algorithms to use when remapping pixels from their original positions to new positions, when **legacy resize mode** is disabled: • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control is only available when **legacy resize mode** is disabled.
clamp image filter	clamp_image_filter	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp image filter** to correct this problem. **Note:** This control is only available when **legacy resize mode** is disabled.
gamma correction	bloom_gamma	disabled	When enabled, a gamma curve of 2.2 is applied before blurring and then reversed for the final output. This is useful for making bokeh lens shape effects warmer and more visible.
bloom	bloom	disabled	When enabled, highlights over the **bloom threshold** are boosted to make lens shape effects more visible.
bloom threshold	bloom_threshold	0.8	When **bloom** is enabled, highlights above this value are multiplied by the **bloom gain** value to make lens shape effects more visible.
bloom gain	bloom_gain	2	When **bloom** 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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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. **Note:** The input must contain a Z depth channel.
	mask	An optional image to use as a mask. By default, the slice 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
ZSlice Tab			
channels	channels	all	The effect is only applied these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Z	N/A	disabled	Enables the associated Z channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **none**.
	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 **mask** input to the predefined **mask.a** 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	When enabled, only apply the effect to the edge of the mask. When disabled, the effect is applied to the entire mask.

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 **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • it was not possible to create a context for processing on the selected GPU, such as when there

Control (UI)	Knob (Scripting)	Default Value	Function
			is not enough free memory available on the GPU. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
view	_view	final result	Select what you want to render into the output. • **intermediate result** - 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 **inside mask** control to **source alpha**. • **final result** - this creates a premultiplied RGBA

Control (UI)	Knob (Scripting)	Default Value	Function
			foreground that can be composited later. You can produce unpremultiplied output by disabling the **premultiply** control.
screen color	_screenColor	0, 0, 0	Sets the screen color to become transparent, usually blue or green background. Click the color swatch next to **screen color** to activate the eye dropper and then **Ctrl**/**Cmd**+**Shift**+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.
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	Controls how much of the chroma difference between the source image and the screen color is used to correct the matte. Increasing **chroma gain** generates a matte that has less transparent areas in the foreground, but can produce harder edges.
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 **alpha bias** 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	If you're using multiple ChromaKeyer nodes to pull several different keys on different parts of the image (multipass keying), set **inside mask** to **source alpha** to add up the results of previous ChromaKeyer nodes. When set to **ignore**, any upstream keys are not taken into account.
despill			
Use custom despill bias	_overrideDespillBias	disabled	Enables the use of the **despill bias** control.
despill bias	despillBias	0.5, 0.5, 0.5	Adjusts the **despill bias** 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. **Note:** This control is disabled unless **Use custom despill bias** is enabled.
replace mode	_replace	ignore	Sets the color method to use for pixels where the alpha of the matte has been modified: • **ignore** - the despilled image is left untouched if the alpha is modified. • **edge hard color** - the despilled image has a corresponding amount of the **replace color** added for any increase in alpha. • **edge linear color** - the image has a corresponding amount of the original pixel (screen color and all)

Control (UI)	Knob (Scripting)	Default Value	Function
			reintroduced/removed if the alpha is changed. • **edge soft color** - the despilled image has a corresponding amount of the **replace color** 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 **edge hard color** option.
add-in matte fix	_replaceAlphaDiff	disabled	When enabled, add the **replace color** into areas corrected using the matte **black point** and **white point** controls to enhance the despill effect.
replace color	_replaceColor	1, 1, 1	When **replace mode** is set to **edge hard color** or **edge soft color**, 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 **replace color** to add in the final result.
premultiply	_preMultiply	enabled	When enabled, premultiply the matte generated by ChromaKeyer with the foreground. Premultiplying the matte can remove noise from the background, but it can also be too aggressive in some areas, such as hair.

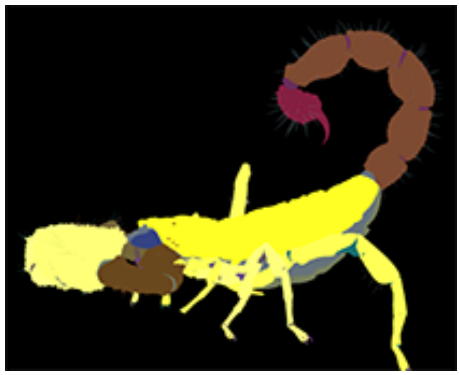
Cryptomatte

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.

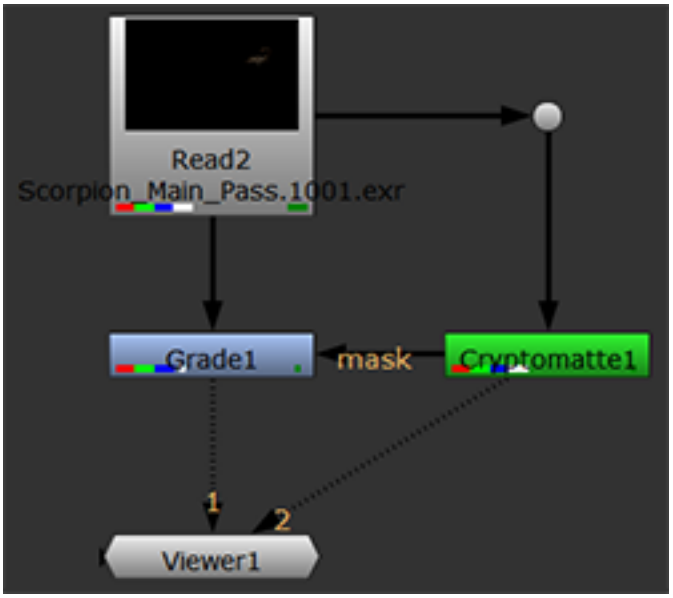
Cryptomatte creates ID mattes in applications such as Maya using organizational information available from a number of renderers including V-Ray and RenderMan. Nuke can then use the Cryptomatte plug-in to isolate individual mattes in the sequence and apply effects to only those areas of the image.

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	Determines which Cryptomatte layer to use. If your input contains just one Cryptomatte layer then it is selected by default and no other layer options are available in this dropdown. If your input contains multiple Cryptomatte layers, one is selected by default but you can change your layer selection using this dropdown.
Manifest Source	manifestSource	Metadata	Determines how the manifest is accessed. • **Metadata** - Choose this option if the manifest is embedded in the input image file's metadata. • **Sidecar** - Choose this option if the manifest is a separate JSON file. If this option is chosen, use the **sidecar** field to define the file location. This control can be used to override the manifest source. **Note:** For more information on manifests, see Cryptomatte Metadata.
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	Controls whether or not the matte boundaries are drawn in the **Viewer**. 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 **Preview** is enabled. Enabled Disabled This allows you to quickly switch between your available mattes and input image to help ensure you are making the correct selections.
Picker Add	pickerAdd	N/A	Add mattes from the Cryptomatte input to the matte selection. This uses Nuke's eyedropper color picker. Click the color swatch ■ next to **Picker Add** and **Ctrl/Cmd** + **Click** a matte to add it to the selection. Selected mattes are displayed in yellow in the **Viewer**. Multiple selections can be added. Once added, matte names are added to the **Matte List**.
Picker Remove	pickerRemove	N/A	Remove mattes from the matte selection. This uses Nuke's eyedropper color picker. Click the color swatch ■ next to **Picker Remove** and **Ctrl** + **Click** a matte to remove it from the selection.

Control (UI)	Knob (Scripting)	Default Value	Function
			Once removed, matte names are also removed from the **Matte List**.
Matte List	matteList	N/A	A list of currently selected matte names. This list can be modified in text form or using the **Picker Add** and **Picker Remove** controls. The **Matte List** 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. **Note:** For more information, see Using the Matte List.
Clear	clearMatteList	N/A	Clears the matte list. All mattes are deselected.
Matte Output	matteOutput	Enabled, rgba.alpha	Determines whether the extracted matte is written out to a channel and if so, the channel to which the extracted matte is written. When enabled, the mattes are written to the channel selected from the dropdown. When disabled the matte is not written to a channel, and would have the same result as setting the channel to **none**.
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 exisiting set of mattes: • **auto** - the name of the matte source node is used. For example, **Roto1**. • **manual** - enter the matte name manually using the matteName control.
	matteName		When **Matte Name** 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. 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.
Cryptomatte Layer	n/a	none	Sets the layer to which the new matte is added. You can also select **none** to have the matte added separately or **new** 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 **.exr** 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 **sat_thrsh** 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 **c** 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	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 **erode** and **patchblack** sliders should be set to 0 when you're adjusting these values. As a rule of thumb, if you have a dark green discolored area, increase **darks g**. Similarly, if you have a light red discolored area, increase the **lights r** value.
lights	mult	1, 1, 1	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 **erode** and **patchblack** sliders should be set to 0 when you're adjusting these values. As a rule of thumb, if you have a dark green discolored area, increase **darks g**. Similarly, if you have a light red

Control (UI)	Knob (Scripting)	Default Value	Function
			discolored area, increase the **lights r** 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: • An IBKColor node. This creates the clean plate (that is, takes the color that is keyed out and creates a smoother representation of that). • 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. If you have set **screen type** to **pick**, 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: • **C-blue** - select this if your foreground image is a bluescreen image and you want to use the **c** input (a clean plate) to drive the key. • **C-green** - select this if your foreground image is a greenscreen image and you want to use the **c** input (a clean plate) to drive the key. • **pick** - 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 Primatte.

Control (UI)	Knob (Scripting)	Default Value	Function
color	color	0, 0, 1	If you've set **screen type** to **pick**, use this control to pick a color that best represents the area you are trying to key.
red weight	red_weight	0.5	Sets how the red channel is weighted in the keying calculation. This affects the hardness of the matte in primarily red areas. If you check **screen subtraction** 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 **red weight**. This may affect other edges, so it's often a good idea to use multiple IBKGizmos with different weights split with Keymix nodes (**Merge** > **Keymix**).
blue/green weight	blue_green_ weight	0.5	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. If you're using a bluescreen, this controls the green weight. If you're using a greenscreen, this controls the blue weight. 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.
luminance match	lm_enable	disabled	Adds a luminance factor to the keying and helps to capture transparent foreground areas that are brighter than the background. You can also use **luminance match** to lessen some of the

Control (UI)	Knob (Scripting)	Default Value	Function
			screen area noise if you lower the **screen range**. However, pushing this control too far will eat into your foreground blacks. You can use this to firm up the alpha channel in the lighter areas.
screen range	level	1	Lower this until it stops changing the background. If there's too much noise left in the backing region, you may want to degrain the footage before pulling the key. This may clear the noise from the backing region, but you may also end up hardening the edges of the matte.
luminance level	luma	0	Allows you to control the strength of the overall effect. This is usually only effective in a small number of cases, generally you don't have to adjust this.
enable	ll_enable	disabled	Check this to activate the luminance level control.
autolevels	autolevels	disabled	Can be used to reduce any hard edges from a foreground object with saturated colors. The same can be achieved with the **weights**, but the autolevels control affects only the saturated colors whereas the weights affect the entire image. 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. 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 **magenta** box.

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	To have the keyer subtract the foreground from the RGB, check this control. To premultiply the original foreground with the generated matte, uncheck this control.
use bkg luminnance	ublu	disabled	To have the **bg** input affect the brightness of the edge, check **use bkg luminance**. These controls are best used with the **luminance match enable** 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 (**Color** > **Grade**) just before input. If it's just an area that needs help, draw a Bezier shape (Draw > **RotoPaint**) around the area and grade the bg input up or down locally to remove the artifact.
use bkg chroma	ubcr	disabled	To have the **bg** input affect the color of the edge, check **use bkg chroma**. These controls are best used with the **luminance match enable** 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 (**Color** > **Grade**) just before

Control (UI)	Knob (Scripting)	Default Value	Function
			input. If it's just an area that needs help, draw a Bezier shape (**Draw** > **RotoPaint**) 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	Select how you want to combine the matte with the existing output channels. • **replace** - replace the existing output channels with the matte • **intersect** - create an intersection of the matte and the existing channels. • **union** - create a combination of the matte and the existing channels.
invert	invert	disabled	Inverts the use of the alpha channel so that the result is a non-white matte.
operation	operation	luminance key	Select which keying tool you want to use for keying your sequence: • **red keyer** - use the red channel to pull the key. • **green keyer** - use the green channel to pull the key. • **blue keyer** - use the blue channel to pull the key. • **redscreen** - subtract the red channel from other channels. • **greenscreen** - subtract the green channel from other channels. • **bluescreen** - subtract the blue channel from other channels. • **luminance key** - use the luminance value to pull the key. • **saturation key** - use the saturation value to pull the key.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **max keyer** - use the maximum values of the red, green and blue channels to pull the key. • **min keyer** - use the minimum values of the red, green and blue channels to pull the key.
range	range	N/A	Drag the **A**, **B**, **C**, and **D** delimiter handles in the graph to adjust your keying result. The **A** delimiter marks the value where you want the keying to start, the distance between **B** and **C** mark the length of the full effect and delimiter **D** indicates where the effect stops.
A	range	1	Enter the value for delimiter **A** in the **range** graph. You can also drag the handle in the graph.
B	range	1	Enter the value for delimiter **B** in the **range** graph. You can also drag the handle in the graph.
C	range	1	Enter the value for delimiter **C** in the **range** graph. You can also drag the handle in the graph.
D	range	1	Enter the value for delimiter **D** in the **range** 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	Select what you want to render into the output. • **Source** - view the blue/green screen foreground image. • **Source Alpha** - view the foreground image's alpha channel. • **Screen Matte** - view the matte created from picking the Screen Color. It does not include any inside or outside masks. • **Inside Mask** - view the inside input. This is used to firm up the foreground matte to stop print through. • **Outside Mask** - view the outside input. The outside mask is used as a garbage mask to reveal the background.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Combined Matte** - view the screen matte, inside mask, and outside masks added together. • **Status** - view an exaggerated view of the key so that minor problems are shown clearly. • **Intermediate Result** - 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. • **Final Result** - this creates a premultiplied RGBA foreground that can be composited later. There's an Unpremultiply Result checkbox you can use if you wish. • **Composite** - this renders the foreground composited over the background using all mattes, spill and color corrections.
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 **AlphaBias** 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 **DespillBias** 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. **Note:** This control is disabled unless **Use Alpha Bias for Despill** is disabled.
Use Alpha Bias for Despill	gangBiases	enabled	When enabled, use the **AlphaBias** color as the **DespillBias** color. When disabled, set the **DespillBias** 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
			Note: 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. **Note:** 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 **ClipBlack** and **ClipWhite** 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. **Note:** 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	Sets the color method to use for pixels where the alpha of the Screen Matte has been modified: • **None** - the despilled image is left untouched if the alpha is modified. • **Source** - the image will have a corresponding amount of the original pixel (screen color and all) reintroduced/removed if the alpha is changed. • **Hard Color** - the despilled image has a corresponding amount of the **Screen Replace Color** added for any increase in alpha. • **Soft Color** - the despilled image has a corresponding amount of the **Screen Replace Color** 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 **Hard Color** option.
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 **Inside Mask** > **Inside Replace** is set to **HardColor** or **SoftColor**.
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	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 **View** output set to **Intermediate Result**: • **Ignore** - this does not add any embedded alpha to the screen matte. • **Add To Inside Mask** - the embedded alpha is added to the inside mask. You should select this when multipass keying with **View** set to **Intermediate Result**. • **Normal** - the embedded alpha is used to composite the image.
Inside Replace	insideReplaceMethod	Soft Color	Sets the color method to use for pixels where the alpha of the Inside Matte has been modified: • **None** - the despilled image is left untouched if the alpha is modified. • **Source** - the image will have a corresponding amount of the original pixel (screen color and all) reintroduced/removed if the alpha is changed. • **Hard Color** - the despilled image has a corresponding amount of the **Screen Replace Color** added for any increase in alpha. • **Soft Color** - the despilled image has a corresponding amount of the **Screen Replace Color** added for any increase in alpha, however, it attempts to modulate the

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 **Hard Color** 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 **Inside Mask** > **Inside Replace** is set to **HardColor** or **SoftColor**.
Crops			
X Method	SourceXMethod	Color	When the crop controls are in use, sets the fill method to use on the X axis at the edges of the clip: • **Color** - uses the **Edge Color** to fill the cropped area. • **Repeat** - the edge pixels are used to fill the cropped area. • **Reflect** - an equal number of pixels are reflected back from the image to fill the cropped area. • **Wrap** - an equal number of pixels are wrapped from the opposite edge to fill the cropped area.
Y Method	SourceYMethod	Color	When the crop controls are in use, sets the fill method to use on the Y axis at the edges of the clip: • **Color** - uses the **Edge Color** to fill the cropped area. • **Repeat** - the edge pixels are used to fill the cropped area. • **Reflect** - an equal number of pixels are reflected back from the image to fill the cropped area. • **Wrap** - an equal number of pixels are wrapped

Control (UI)	Knob (Scripting)	Default Value	Function
			from the opposite edge to fill the cropped area.
Edge Color	SourceEdgeColour	0	When an **XY Method** is set to **Color**, 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	Sets the component to use from any Inside Mask attached to the **InM** input: • **Luminance** - the luminance of the image connected to the **InM** input is used. • **Inverted Luminance** - the luminance of the image connected to the **InM** input is inverted before use as the mask. • **Alpha** - the alpha of the image connected to the **InM** input is used. • **Inverted Alpha** - the alpha of the image connected to the **InM** input is inverted before use as the mask.
OutM Component	outsideComponent	None	Sets the component to use from any Outside Mask attached to the **InM** input: • **Luminance** - the luminance of the image connected to the **OutM** input is used. • **InvertedLuminance** - the luminance of the image connected to the **OutM** input is

Control (UI)	Knob (Scripting)	Default Value	Function
			inverted before use as the mask. • **Alpha** - the alpha of the image connected to the **OutM** input is used. • **InvertedAlpha** - the alpha of the image connected to the **OutM** 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
		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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Primatte Tab			
foreground	foreground	rgb	Channels from the **fg** input containing the image to key and composite.
background	background	rgb	Channels from the **bg** input to composite over, and to calculate the spill suppression.
crop	crop	N/A	The area of the input image you want to keep. Anything outside this box is cropped. You can adjust the following: • **x** - the distance (in pixels) between the left edge of the original image and the left side of the crop box. • **y** - the distance (in pixels) between the bottom edge of the original image and the bottom edge of the crop box. • **r** - the distance (in pixels) between the left edge of the original image and the right side of the crop box. • **t** - the distance (in pixels) between the bottom edge of the original image and the top edge of the crop box. • **w** - the width of the crop box. This is only available if you click the **wh** button. • **h** - the height of the crop box. This is only available if you click the **wh** button. You can also adjust the crop box in the Viewer by

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 **none**.
	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	Choose which algorithm Primatte uses to calculate your keying result: • **Primatte** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **PrimatteRT** - 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 **Primatte** algorithm. Other disadvantages of the **Primatte RT** 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. • **Primatte RT+** - 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 **Primatte RT+** 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.
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 **Auto-Compute** 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	Select the type of degrain to use: • **none** - you get the color of the exact pixel sampled. • **small** - gets the average color of a small region of the area around the sampled pixel. Use this when the grain is very dense. • **medium** - gets the average color of a medium-sized region of the area around the sampled pixel. Use this when the grain is less dense. • **large** - gets the average color of a larger region of the area around the sampled pixel. Use this when the grain is very loose.
tolerance	graintolerance	0.2	Increases the effect of the **Clean BG Noise** 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.
Actions			
operation	mode	Smart Select BG Color	What the colors you sample in the Viewer do: • **Smart Select BG Color** - 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. • **Clean BG Noise** - removes noise from the background. Any pixels you sample in the Viewer are

Control (UI)	Knob (Scripting)	Default Value	Function
			known to be 100% background. White noisy areas in the 100% background region become black. • **Clean FG Noise** - 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.
operation (continued)			• **Matte Sponge** - 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. • **Make FG Trans.** - 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. • **Restore Detail** - 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. • **Spill Sponge** - 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.
operation			• **Spill(-)** - removes color spill from the sampled pixel

Control (UI)	Knob (Scripting)	Default Value	Function
(continued)			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. • **Spill(+)** - 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 **Spill (-)** step. • **Matte(-)** - 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. • **Matte(+)** - 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 **Matte (-)** step.
operation (continued)			• **Detail(-)** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Detail(+)** - 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 **Detail (-)** step. • **Fine Tuning Sliders** - 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. • **3D Sample** - 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. • **Simple Select BG Color** - 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.
	currentColor	black	To sample colors from the Viewer, make sure this is pushed in (displaying an eyedropper), then **Ctrl/Cmd**+click in the Viewer to pick single pixels, or **Ctrl/Cmd**+**Shift**+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	When enabled, Primatte internally creates two keys from the same image: • **core** - This matte has the transparency removed, but suffers from the bad edges on the foreground object. • **edge** - This matte has a clean edge on the foreground, but suffers from transparency within the foreground object. The **core** matte with the bad edges is then blurred and eroded before it is composited over the **edge** matte that has the transparency, resulting in a composite with the best of both options. This can help you deal with foregrounds that contain a color that is close to the backing screen color.
Adjust Lighting			
threshold	lightingSPoly	10	When **adjust lighting** 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 **adjust lighting** 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 **hybrid render** is enabled, sets the amount of erosion performed on the **core** matte. To view the results, set **output mode** to **hybrid core** and view the alpha channel.
blur radius	hybridBlurRadius	0.5	When **hybrid render** is enabled, sets the blur radius

Control (UI)	Knob (Scripting)	Default Value	Function
			used when blurring the **core** matte. To view the results, set **output mode** to **hybrid edge** 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	The color spill replacement method to use: • **no suppression** - no spill suppression is applied. • **complement** - replaces the spill color with the complement of the backing screen color. • **solid color** - replaces the spill color with a solid color of your choice. Use **replace color** below to choose the color. • **defocused background** - replaces the spill color with colors from a defocused version of the background image. Use **defocus** to adjust the amount of defocus applied to the background buffer

Control (UI)	Knob (Scripting)	Default Value	Function
			image.
replace color	replaceColor	0.18	When **replace with** is set to **solid color**, allows you to select a solid color to use to replace the spill.
defocus	defocus	10	When **replace with** is set to **defocused background**, sets the amount to defocus the background for spill process.
Output			
output mode	output_mode	composite	Determines what the output from the node should be: • **composite** - premultiplies the foreground with the background based on the matte created. This is your final result. • **premultiplied** - 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 **operation** set to **over**) 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 colorspaces 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **unpremultiplied** - 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 **operation** set to **matte**) 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 colorspaces 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.
output mode (continued)			• **notpremultiplied** - outputs the original foreground pixels (instead of the result of the Primatte node), along with the calculated matte. • **adjust lighting FG** - 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. • **adjust lighting BG** - outputs the optimized artificial backing screen that the adjust lighting mode creates (a clean backing screen that has no foreground object). • **hybrid core** - outputs the internally generated core matte, used when hybrid render is enabled. • **hybrid edge** - outputs the internally generated edge matte, used when hybrid render is enabled.
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. 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 **Film** tab are activated.
screen correct	screen_correct	enabled	When enabled, the controls on the **Screen Correct** tab are activated.
shadow	shadow	disabled	When enabled, the controls on the **Shadow** tab are activated.
spill suppression	spill_suppression	enabled	When enabled, the controls on the **Spill** tab are activated.
cleanup	cleanup	disabled	When enabled, the controls on the **Cleanup** tab are activated.
color conformance	color_conformance	disabled	When enabled, the controls on the **Color** tab are activated.
overlay	overlay_mode	off	Select overlay rendering mode: • **off** - do not display an overlay. • **screen** - leave the subject unchanged and display the preliminary matte area blended with the overlay color. • **subject** - view the subject blended with overlay

Control (UI)	Knob (Scripting)	Default Value	Function
			color, and leave the preliminary matte area unchanged. • Use the add and remove overlay tools to select pixels that should be included in, or excluded from, the screen correct region. • **Note:** 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 **Reset** button on the **ScreenCorrect** tab.
show image as monochrome	overlay_mono	disabled	When **overlay** is set to **screen** or **subject**, 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 **overlay** is set to **screen** or **subject**, sets the overlay color. Adjust the alpha channel to modify the opacity of the overlay.
output mode	output_mode	Composite	Sets the type of output to produce: • **composite** - displays a composite of the screen and subject output. • **premultiplied** - displays the premultiplied screen and subject. • **unpremultiplied** - displays the unpremultiplied screen and subject.
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
			Note: 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. **Note:** 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. **Note:** 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. **Note:** 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 **Screen Correction**

Control (UI)	Knob (Scripting)	Default Value	Function
			controls are activated. There are a few cases where you can get better results by disabling screen correction: • 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. • 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. 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. **Note:** 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.
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 **shrink** 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: • **off** - no orphan pixels are removed automatically. • **coarse** - low level exclusion. • **medium** - medium level exclusion. • **fine** - high level exclusion.
reset	reset	N/A	Click to reset the **ScreenCorrect** settings to their default values.
Shadows Tab			
enable	shadow	disabled	When enabled, the **Shadows** controls are activated. 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. 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. 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	When enabled, the **Spill** controls are activated. The Ultimatte algorithms automatically suppresses spill if spill suppression processing is enabled. Use the **Spill** controls to eliminate excessive spill and to restore color similar to the backing that has been inappropriately removed from the foreground. The effects of the **Spill** controls can be seen in the processed foreground, but are best judged using the **composite** output mode.
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.
midtones	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	Sets the background veiling color used to override the automatic suppression of the backing color, which attempts to suppress the backing color to black. 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). **Note:** In most cases this control can be left at the default value.
reset	reset	N/A	Click to reset all **Spill** settings to their default values.
Cleanup Tab			
enable	cleanup	disabled	When enabled, the **Cleanup** controls are activated. 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 **ScreenCorrect**

Control (UI)	Knob (Scripting)	Default Value	Function
			controls instead. The effects of the **Cleanup** 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. **Note:** 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 **Cleanup** controls have no effect.
Color Tab			
enable	color_conformance	disabled	When enabled, the **Color** controls are activated. 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 **Color** controls. The effects of the **Color** controls are best judged using the **composite** 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. 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. 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 **Film** controls are activated. These controls attempt to reduce the effects of cyan undercutting, a phenomenon the 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). Transparency is most easily judged using the **composite** 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. Corrections are most easily judged using the **composite** output mode.
strength	film_strength	0	Adjusts the overall amount of film **correction** 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	An optional image to use as a mask. By default, merge 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
AddMix Tab			
A	A	rgba	Select the channels to use on the A input. You can use the checkboxes on the right to select individual channels.
B	B	rgba	Select the channels to use on the B input. You can use the checkboxes on the right to select individual channels.
output	output	rgba	Render into selected output channels. You can use the checkboxes on the right to select individual channels.
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	An optional image to use as a mask. By default, the blend effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Blend Tab			
channels	channels	all	The blend effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
[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 **none**.
	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 **mask.a** 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 or 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 **Resolution** bounds.
Row Order	roworder	BottomTop	Sets the row display order: • **TopBottom** - rows are populated from the top downward. • **BottomTop** - rows are populated from the bottom upward.

Control (UI)	Knob (Scripting)	Default Value	Function
Column Order	colorder	LeftRight	Sets the column display order: • **LeftRight** - columns are populated from left to right. • **RightLeft** - columns are populated from right to left. • **Snake** - columns are populated in alternate directions, starting from left to right.
Use frames instead of inputs	splitinputs	disabled	When enabled, the **FrameRange** specified is read from each input and displayed in the Contact Sheet. For example, with 4 inputs and **FrameRange** 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 **Use frames instead of inputs** 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	Them image to which the rectangle is copied.

Control (UI)	Knob (Scripting)	Default Value	Function
CopyRectangle Tab			
channels	channels	all	Sets the channels to copy from input A within the specified rectangle. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
area xyrt	area	512 389 1536 1167	Sets the bounds of the copy rectangle on the xy axes and the rectangle position from the right and top.
softness	softness	0	Allows you to 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. A value of 0 produces no vignetting.
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	An optional image to use as a mask. By default, the dissolve effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Dissolve Tab			
channels	channels	all	The dissolve effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
which	which	0	Select the inputs to dissolve between. 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.
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 **none**.
	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 **mask** input to the predefined **mask.a** 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. 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**. By default, this input is copied to input **B** only where the **mask** is non-black.
	B	The image sequence to merge with input **A**.
	mask	The image to use as a mask. By default, the effect of input **A** 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 **A**. Any other channels are copied unchanged from input **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 **none**.
	maskChannel	rgba.alpha	The channel to use as a mask. By default, the effect of input **A** 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 **A** is limited to the non-white areas of the mask.
mix	mix	1	Dissolves between the original **B** input at 0 and the full Keymix effect at 1.
Set BBox to	bbox	union	How to output the bounding box: • **union** - combine the two bounding boxes. • **B side** - use the bounding box from input **B**. Any data from the **A** input that's outside this box is clipped. • **A side** - use the bounding box from input **A**. Any data from the **B** input that's outside this box is clipped.

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 or rows and columns in the Contact Sheet when **automatic rows/columns** 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 **Resolution** bounds.
Row Order	roworder	BottomTop	Sets the row display order: • **BottomTop** - rows are populated from the bottom upward.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **TopBottom** - rows are populated from the top downward.
Column Order	colorder	LeftRight	Sets the column display order: • **LeftRight** - columns are populated from left to right. • **RightLeft** - columns are populated from right to left.
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	An optional image to use as a mask. By default, the merge 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 **mask** control isn't disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Merge Tab			
operation	operation	over	Sets the Merge algorithm to use: • **atop** - Shows the shape of image **B**, with **A** covering **B** where the images overlap. Algorithm: **Ab+B(1-a). Where a,b>=0** • **average** - The average of the two images. The result is darker than the original images. Algorithm: **(A+B)/2**

Control (UI)	Knob (Scripting)	Default Value	Function
			• **color-burn** - Image **B** gets darker based on the luminance of **A**. Algorithm: **1-(1-B)/max(A,1-B)** • **color-dodge** - Image **B** gets brighter based on the luminance of **A**. Algorithm: **B/max(1-A,B)** • **conjoint-over** - Similar to the **over** operation, except that if a pixel is partially covered by both **a** and **b**, conjoint-over assumes **a** completely hides **b**. For instance, two polygons where **a** and **b** share some edges but a completely overlaps **b**. Normal **over** produces a slightly transparent seam here. Algorithm: **A+B(1-a/b), A if a>b** • **copy** - Only shows image **A**. This is useful if you also set the **mix** or **mask** controls so that some of B can still be seen. Algorithm: **A** • **difference** - How much the pixels differ. See also Absminus. Algorithm: **abs(A-B)** • **disjoint-over** - Similar to the over operation, except that if a pixel is partially covered by both **a** and **b**, disjoint-over assumes the two objects do not overlap. For instance, two polygons that touch and share an edge. Normal **over** produces a slightly transparent seam here. Algorithm: **A+B(1-a)/b, A+B if a+b<1** • **divide** - Divides the values but stops two negative values from becoming a positive number. Algorithm: **A/B if B>0, otherwise A** • **exclusion** - A more photographic form of **difference**. Algorithm: **A+B-2AB. Where A,B>=0** • **from** - Image **A** is subtracted from **B**. Algorithm: **B-A** • **geometric** - Another way of averaging two images. Algorithm: **2AB/(A+B) if A,B>0, otherwise 0** • **hard-light** - Image **B** is lit up by a very bright and

Control (UI)	Knob (Scripting)	Default Value	Function
			sharp light in the shape of image **A**. Algorithm: **2AB if 2A<1, otherwise 1-2(1-A)(1-B) if A,B<1, otherwise 0** • **hypot** - 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: **diagonal sqrt(A*A+B*B)** • **in** - Only shows the areas of image **A** that overlap with the alpha of **B**. See also In. Algorithm: **Ab** • **mask** - This is the reverse of the **in** operation. Only shows the areas of image **B** that overlap with the alpha of **A**. Algorithm: **Ba** • **matte** - Premultiplied over. Use unpremultiplied images with this operation. See also Matte. Algorithm: **screen(A,a,B,b) if A==a, B if a<=0, Aa+B(1-a) if a<1, otherwise A** • **max** - Takes the maximum values of both images. See also Max. Algorithm: **max(A,B)** • **min** - Takes the minimum values of both images. See also Min. Algorithm: **min(A,B)** • **minus** - Subtracts B from A. Algorithm: **A-B** • **multiply** - Multiplies the values but stops two negative values from becoming a positive number. See also Multiply. Algorithm: **A if A<0 and B<0, otherwise AB** • **out** - Only shows the areas of image **A** that do not overlap with the alpha of **B**. See also Out. Algorithm: **A(1-b)** • **over** - This is the default operation. Layers image **A** over **B** according to the alpha of image **A**. Algorithm: **A+B(1-a)** • **overlay** - Image **A** brightens image **B**. Algorithm: **2AB if 2B<1, otherwise 1-2(1-A)(1-B). Where A,B>=0**

Control (UI)	Knob (Scripting)	Default Value	Function
			• **plus** - The sum of image **A** and **B**. Note that the **plus** algorithm may result in pixel values higher than 1.0. See also Plus. Algorithm: **A+B** • **screen** - If **A** or **B** is less than or equal to 1 the **screen**, else use the maximum example. Similar to **plus**. See also Screen. Algorithm: **A+B-AB if 0<A<1 and 0<B<1, otherwise max(A,B)** • **soft-light** - Image **B** is lit up. Similar to **hard-light**, but not as extreme. Algorithm: **2AB+B(1-AB) if AB<1, otherwise 2AB** • **stencil** - This is the reverse of the **out** operation. Only shows the areas of image **B** that do not overlap with the alpha of **A**. Algorithm: **B(1-a)** • **under** - This is the reverse of the **over** operation. Layers image **B** over **A** according to the matte of image **B**. Algorithm: **A(1-b)+B** • **xor** - Shows both image **A** and **B** where the images do not overlap. Algorithm: **A(1-b)+B(1-a)**
Video colorspace	sRGB	disabled	When enabled, colors are converted to the default 8-bit colorspace (**ProjectSettings** > **LUT** > **8-bit files**) before doing the composite and results are converted back to linear afterwards.
alpha masking	screen_alpha	disabled	When enabled, the input images are unchanged where the other image has zero alpha, and the output alpha is set to **a+b-a*b**. When disabled, the same math is applied to the alpha as is applied to the other channels. **Note:** This option is disabled on operations where it makes no difference or PDF/SVG specifications says it should not apply.

Control (UI)	Knob (Scripting)	Default Value	Function
set bbox to	bbox	union	Sets the output bounding box type and any data outside this region is clipped off: • **union** - Resize the output bbox to fit both input bboxes completely. • **intersection** - Use only those parts of the image where the input bboxes overlap. • **A** - Use input A's bbox. • **B** - Use input B's bbox.
metadata from	metainput	B	Sets which input's metadata is passed down the node tree. **Note:** When **metadata from** is set to **All** and there are keys with the same name in both inputs, keys in B override keys in A.
range from	rangeinput	B	Sets which input's range is passed down the node tree.
A channels	Achannels	rgba	Sets the channels from the A input(s) to merge with the B channels, and which channel to treat as the A alpha. **Note:** Setting **A channels** to none is the same as black or zero.
B channels	Bchannels	rgba	Sets the channels to use from the B input, and which channel to treat as the B alpha.
output	output	rgba	Sets the channels to which the merge of the A and B channels are written.
also merge	also_merge	none	Sets the channels that are merged in addition to those specified in the A channels and B channels controls.

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 **none**.
	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 **mask** input to the predefined **mask.a** 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 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	An optional image to use as a mask. By default, the merge 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 **mask** control isn't disabled or set to **none**.

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	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr0	N/A	The expression to apply to the above channels. 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**.
channels	channel1	green	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr1	N/A	The expression to apply to the above channels. 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**.

Control (UI)	Knob (Scripting)	Default Value	Function
channels	channel2	blue	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr2	N/A	The expression to apply to the above channels. 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**.
channels	channel3	alpha	The channel(s) to which you want to apply the expression in the below **=** field. You can use the checkboxes on the right to select individual channels.
=	expr3	N/A	The expression to apply to the above channels. 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**.

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 **none**.
	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 **mask** input to the predefined **mask.a** 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 **none**.
	unpremult	none	The image is divided by this channel before being processed, and multiplied again afterwards. If you are using premultiplied input images, you may want to check **(un)premult by** and select **rgba.alpha** here. This will simulate doing the merge before the premultiplication was done. If you are using unpremultiplied input images, you should leave this set to **none**.
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: **A if A<0 and B<0, otherwise AB**. 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). 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 **none**.
	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 0<A<1 and 0<B<1, otherwise max(A,B)** . In other words, if **A** or **B** is between 0 and 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	The input to display. Each input is displayed at the value corresponding to the number of the input. For example: • Setting **which** to 4 displays the image from input 4. • Setting **which** to 6 displays the image from input 6.

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: • **0** - the frame before the **in** frame. • **1** - the frame after the **out** frame.
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). 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 **none**.
	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 (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]	Images to merge together based on their Z depth values. 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.

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 **none**.
	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	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. When disabled, lighter Z values are further away and hidden by darker Z values.
Alpha channel	N/A	enabled	Enables the associated alpha channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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	Adjust the width and height of the input image's bounding box by adding or removing pixels. Click the **2** button to display separate fields for width (**w**) and height (**h**). If you crop the bounding box, the edge pixels of the bounding box area get replicated towards the edges of the image.

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 **cs_center**.
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	Sets the seed used to create the random shake pattern. You can change this number to produce a slightly different pattern. You can copy this seed to other CameraShake nodes to copy the shake motion.
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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
crop	black_outside	disabled	When disabled, the outside area is filled with the outermost pixels of the image sequence. When enabled, this renders as black pixels outside the image boundary, making it easier to layer the element over another. **Note:** This control also adds a solid alpha covering the input image area if no alpha is present.

Control (UI)	Knob (Scripting)	Default Value	Function
motionblur	motionblur	1	Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences. 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.
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	centered	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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	The File Menu lets you: • **Import chan file** - 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. • **Export chan file** - Export the transformation data you have applied to the card as a channel file. This is a useful method of sharing setups between artists.
	snap_menu	N/A	The Snap Menu lets you: • **Match selection position** - match the position of the card to any vertices you have selected on a 3D geometry object in the Viewer. • **Match selection position, orientation** - match the position and orientation of the card to any vertices you have selected on a 3D geometry object in the Viewer. • **Match selection position, orientation, size** - match the position, orientation, and size of the card to any vertices you have selected on a 3D geometry object in the Viewer. To select vertices in the Viewer, you need to attach a 3D object to the Viewer and press **Tab** to activate the Viewer's 3D mode. Then, click to activate the **Vertex selection** tool, and select vertices on the object by dragging a marquee over them.
transform order	xform_order	SRT	Select the order by which Nuke executes scales, rotations, and translations (**S** signifies scale, **R**

Control (UI)	Knob (Scripting)	Default Value	Function
			rotation, and **T** translation). The order can affect the outcome.
rotation order	rot_order	ZXY	Select the order by which Nuke executes rotation on individual axes (**X**, **Y**, and **Z**).
translate xyz	translate	0, 0, -1	Translates the card on the x,y, and z axes. 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. Alternatively, you can press **Ctrl**/**Cmd** 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. 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 **scale xyz** 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 **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 card. Subsequent local transformations will then occur relative to the new pivot point location. You can also position the pivot point by pressing **Ctrl**/**Cmd**+**Alt** 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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.
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 **Z**, 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 **Z**, 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 **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated on the **Project Settings** 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
			• **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** checked. However, you may want to turn this off for camera shake, or if you want to texture-map or

Control (UI)	Knob (Scripting)	Default Value	Function
			intersect the output with a similar shape. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
motionblur	motionblur	0	Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences. 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.
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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - open the shutter at the time you specify.

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 **shutter offset** control is set to **custom**, 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	The image that will replace the feature tracked using the Tracker node. Note that the CornerPin2D node should NOT be connected to the Tracker node or the Tracker node's input image.

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, **Ctrl**/**Cmd**+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, **Ctrl**/**Cmd**+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, **Ctrl**/**Cmd**+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, **Ctrl**/**Cmd**+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 **from1-4** values to the **to1-4** 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 **to** values are 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the

Control (UI)	Knob (Scripting)	Default Value	Function
			negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
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
			sequences. 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.
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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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 **to1** 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 **to2** 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 **to3** 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 **to4** 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 **from** values to the input format.
Copy 'to'	copy_from_to	N/A	Click to copy and paste the **to1-4** values to the **from1-4** 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 (or x, y, w, h)	box	N/A	The area of the input image you want to keep. Anything outside this box is cropped. You can adjust the following: • **x** - the distance (in pixels) between the left edge of the original image and the left side of the crop box. • **y** - the distance (in pixels) between the bottom edge of the original image and the bottom edge of the crop box. • **r** - the distance (in pixels) between the left edge of the original image and the right side of the crop box. • **t** - the distance (in pixels) between the bottom edge of the original image and the top edge of the crop box. • **w** - the width of the crop box. This is only available if you click the **wh** button. • **h** - the height of the crop box. This is only available if you click the **wh** button.

Control (UI)	Knob (Scripting)	Default Value	Function
			You can also adjust the crop box in the Viewer by dragging its edges.
softness	softness	0	Allows you to to vignette the edges of the cropped portion. The larger the value, the more of the area around the edges is faded to black. A value of 0 produces no vignetting.
reformat	reformat	disabled	When enabled, the image output format is changed to match the cropped image. When disabled, the original image output format is used.
intersect	intersect	disabled	When enabled, the output bounding box is an intersection of the crop bounding box and the incoming bounding box. When disabled, the output bounding box matches the crop bounding box and can extend outside the incoming bounding box.
black outside	crop	enabled	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. In most cases, you should keep **black outside** checked. However, you may want to turn this off for camera shake,

Control (UI)	Knob (Scripting)	Default Value	Function
			or if you want to texture-map or intersect the output with a similar shape. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.

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 **background** control is set to **bg**.
	dst	The destination image to warp to.
	src	The source image to warp from.
	mask	An optional image to use as a mask. By default, the warp effect 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.

Control (UI)	Knob (Scripting)	Default Value	Function
GridWarp Tab			
channels	channels	all	The warp effect is only applied to these channels. If you set this to something other than **all** or **none**, 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	When enabled, only apply the effect to the edge of the mask. When disabled, the effect is applied to the entire mask.
Source Grid			
keys	source_grid_keys	0, 0	Controls keyframes applied to the Source Grid: • **keys** - displays the current and total number of keyframes. • - browse to the previous and next keyframe. • - add or remove a keyframe on the current frame. • - copy a keyframe to the clipboard.

Control (UI)	Knob (Scripting)	Default Value	Function
			• - paste a keyframe from the clipboard. **Note:** If Viewer tools **auto** is enabled, any changes to the grid are automatically set as keyframes at the current frame.
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 **Source Grid** to the same size as the **src** input image.
Destination Grid			
keys	destination_grid_keys	0, 0	Controls keyframes applied to the Destination Grid: • **keys** - displays the current and total number of keyframes. • - browse to the previous and next keyframe. • - add or remove a keyframe on the current frame. • - copy a keyframe to a temporary buffer. • - paste a keyframe from the temporary buffer. **Note:** If Viewer tools **auto** is enabled, any changes to the grid are automatically set as keyframes at the current frame.
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 **Destination Grid** to the same size as the **dst** input image.
Settings			
output	output	source warped	Controls what output is displayed in the Viewer: • **source** - the source image and source grid. • **sourcewarped** - the source image and destination grid. • **destination** - the destination image and destination grid. • **destinationwarped** - the destination image and source grid. • **morph** - the morphed image, controlled by the **warp** and **mix** parameters, and both grids.
warp	warp	1	Controls grid distortion during morphing. The **mix** value controls whether the source or destination grids are affected. **Note:** Warp is only enabled when the output control is set to **morph**.
mix	mix	0	Dissolves between the source image (at 0) and the destination image (at 1). **Note:** Mix is only enabled when the output control is set to **morph**.
background	background	on src	Sets what to use as the warp background: • **on black** - render the warped image on top of a

Control (UI)	Knob (Scripting)	Default Value	Function
			constant black image. • **on src** - render the warped image on top of the image connected to the **src** input of the GridWarp node. • **on dst** - render the warped image on top of the image connected to the **dst** input of the GridWarp node. • **on bg** - render the warped image on top of a background image connected to the **bg** input of the GridWarp node.
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	Sets the boundary box properties. • **union** - both input boundary boxes are combined. • **format** - the input with the largest boundary box is used.
Transform Tab			
Source			
translate xy	source_grid_ transform_translate	0, 0	Translates the selected grid(s) on the x and y axes. Alternatively, you can drag on an axis on the transformation overlay in the Viewer.
rotate	source_grid_ transform_rotate	0	Rotates the selected grid(s) around the **center xy** coordinates. Alternatively, you drag the transformation overlay in the Viewer.
scale	source_grid_ transform_scale	1	Scales the selected grid(s) width and height. Setting one of these to a negative value reverses the selected grid(s) along that axis.

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: • XY • YX
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. 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. 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. 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 **center xy**. Alternatively, you drag the transformation overlay in the Viewer.
scale	destination_grid_ transform_scale	1	Scales the destination grid width and height. 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: • XY • YX
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. Warps 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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 **src** image is morphed using the **Morph Amount** and **Mix** 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. If you set this to something other than **all** or **none**, 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 **none**.
	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 **mask** input to the predefined **mask.a** 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	When enabled, only apply the effect to the edge of the mask. When disabled, the effect is applied to the entire mask.
Mode			
Output	output	Warp	Sets the output displayed in the Viewer: • **Warp** - displays the warped **src** input from the points in the **From** grid to the points in the **To** grid. • **Morph** - displays both grids and the morphed image depending on the warp and mix parameters.
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 **Output** is set to **Warp**, controls the amount of warp between the **From** and **To** grids, where **1** is the full warp and **0** is the source image.
Morph Amount	morph	1	When **Output** is set to **Morph**, controls the strength of morphing between the **From** and **To** grids, where **1** is the full morph and **0** is the source image.
Mix	mix	0	When **Output** is set to **Morph**, 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 **Union**, which combines the two bounding boxes. You can also select **Format** 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 **Black** constant or the **Source** 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	Displays the state of the From grid where the warp or morph operation begins. • - click to link or unlink the **From** and **To** grids. When linked, changes to either grid are applied to the other.

Control (UI)	Knob (Scripting)	Default Value	Function
			• - click to make the selected grid active. • - click to hide the selected grid. • - click to lock the selected grid. Vertices on a locked grid cannot be adjusted. • - click to change the color of the selected grid.
To	N/A	N/A	Displays the state of the To grid where the warp or morph operation ends. Also displays the state of any adjustment grids, if present. • - click to link or unlink the **From** and **To** grids. When linked, changes to either grid are applied to the other. Adjustment grids cannot be linked to other grids. • - click to make the selected grid active. • - click to hide the selected grid. • - click to lock the selected grid. Vertices on a locked grid cannot be adjusted. • - click to change the color of the selected grid. **Note:** GridWarpTracker can process a maximum of six adjustment grids.
Transform Tab			
From			
Translate xy	from_base_ transform_translate	0,0	Adjusts the translation, rotation, and scale values applied to the base grid.
Rotate	from_base_ transform_rotate	0	

Control (UI)	Knob (Scripting)	Default Value	Function
Scale	from_base_ transform_scale	1	
Skew X	from_base_ transform_skewX	0	Adjusts the skew applied to the base grid on the X and Y axes.
Skew Y	from_base_ transform_skewY	0	
Skew Order	from_base_ transform_skew_ order	XY	Sets the order in which skew transforms are applied: **XY** **YX**
Center xy	from_base_ transform_center	dependent on input format or Compositing environment **Project Settings**	Sets the center of rotation and scaling. You can also **cmd** + drag the **Transform** widget in the Viewer. This control defaults to the center of the input format or the **Project Settings** > **full size format** control if no input is connected.
Extra Matrix	from_base_ 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.
To			
Use From Transform	use-source_ transform	enabled	When enabled, the transforms applied to the **From** grid are mirrored on the **To** grid. When disabled, you can apply transforms to the **To** grid independent of the **From** grid.
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 **Use From Translation** 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 **Use From Translation** is disabled.
Skew Y	to_base_transform_skewY	0	
Skew Order	to_base_transform_skew_order	XY	Sets the order in which skew transforms are applied, providing **Use From Translation** is disabled: **XY** **YX**
Center xy	to_base_transform_center	dependent on input format or Compositing environment **Project Settings**	Sets the center of rotation and scaling, providing **Use From Translation** is disabled. You can also **cmd** + drag the **Transform** widget in the Viewer. This control defaults to the center of the input format or the **ProjectSettings** > **full size format** control if no input is connected.
Extra Matrix	to_base_transform_matrix		Adds an extra matrix which is calculated after the transforms defined by the other controls, providing **Use From Translation** is disabled. 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.
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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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 **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.

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	An optional image to use as a mask. By default, the distortion 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
IDistort Tab			
channels	channels	all	The distortion is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
UV channels	uv	none	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.
UV offset	uv_offset	0	This is subtracted from the **UV channels** to set a non-zero center point for renderers that cannot output negative numbers.
UV scale	uv_scale	1	Multiply the **UV channels** by this value.
blur channel	N/A	disabled	Enable the associated blur channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	blur	none	Values in this channel are added to the size of the sample area to add extra blur or diffusion to the distortion.

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 **none**.
	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 **UV** and **blurchannels** have been premultiplied by the alpha channel, such as when output by a renderer.
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.

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
			rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Model Preset	distortionModelPreset	NukeX Classic	Sets the distortion model to use and adds or removes **Distortion Parameter** controls depending on the preset selected: • **NukeX Classic** - uses the distortion model from legacy versions of Nuke. • **CaraVR Radial, Degree 3** - uses a distortion model suitable for CaraVR. • **3DEqualizer** - provides

Control (UI)	Knob (Scripting)	Default Value	Function
			several distortion models suitable for 3DE. • **Custom** - allows you to customize the distortion model from scratch.
Lens Type	lens	Spherical	Sets the lens type used to shoot the sequence: • **Spherical** • **Anamorphic**
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 **x** coefficients in the **Distortion Parameters**.
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. These controls are linked to the controls of the same name on the **Advanced** tab.
	distortionDenominator1	0	
Centre	centre	0,0	Sets the position of the

Control (UI)	Knob (Scripting)	Default Value	Function
			distortion center.
Output			
Mode	output	Undistort	Sets the type of output from the node: • **STMap** - renders both undistortion and redistortion STMaps in the **motion** channels. Use the **forward** channels for undistorting and the **backward** 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. • **Undistort** - undistorts the input directly in the Viewer, allowing to visualize the undistorted overlay grid. • **Redistort** - redistorts the input directly in the Viewer, allowing to visualize the redistorted overlay grid.
Use Fisheye	useFisheye	enabled	When enabled, lens projection is considered as part of the distortion when warping fisheye lenses. When disabled, Nuke renders an 'ideal' fisheye

Control (UI)	Knob (Scripting)	Default Value	Function
			without distortion when undistorting, and applies distortion to a fisheye image when redistorting. **Note:** This control has no effect on **Rectilinear** lenses.
Filter	filter	Cubic	When **Mode** is set to **Undistort** or **Redistort**, 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening

Control (UI)	Knob (Scripting)	Default Value	Function
			(as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
BBox	bboxType	Auto	Sets how the bounding box is calculated: • **Auto** - the bounding box is set automatically, which can lead to a performance hit if the bounds are much larger than the image. • **Input** - the bounding box is set to the same

Control (UI)	Knob (Scripting)	Default Value	Function
			dimensions as the input image. • **Manual** - allows you to set the bounding manually using the outputBBox controls.
	outputBBox	dependent on Compositing environment **Project Settings**	When **BBox** is set to **Manual**, adjust the BBox by entering values in the **x**, **y**, **r**, and **t** controls. You can also use the crop widget in the Viewer to adjust the BBox.
Output Format	outputFormatType	Input	Sets the output format: • **Input** - the output format is the same as the input format. • **Format** - the output format is controlled by the format dropdown. • **BBox** - the output format is the same as the bounding box.
	format	dependent on Compositing environment **Project Settings**	Sets the output format to use when **Output Format** is set to **Format**.
Distortion Scaling	distortionScalingType	Scale to Input Format	Sets the rescaling mode: • **Scale to Input Format** - use the input format to scale the distortion in the

Control (UI)	Knob (Scripting)	Default Value	Function
			output. • **Format** - use the selected format to scale the output.
	outputFormat	dependent on Compositing environment **Project Settings**	Sets the format to use to reformat the image when **Distortion Scaling** is set to **Format**.
Analysis Tab			
Grid Detect			
Detect	detect	N/A	Click to run the selected detection method on all key frames for a calibration grid shot. Grid detection consists of feature detection and feature linking. It can be run in one step, using **Grids** detection, or broken down into two steps to allow for manual corrections. See the **Grid Detection** controls for more information on changing the detection parameters.
N/A	detectionFrameType	Current Frame	Sets the number of frames processed by the **Detect** button: • **Current Frame** - only detect grids on the current frame.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Every N Frames** - 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 **5** frames.
Preview	preview	disabled	You can enable the **Preview** control to view the features that the LensDistortion node is likely to find when you click the **Detect** button. You can adjust the controls in the **Settings** dropdown to improve the result and then click **Detect**.
Settings			
Number of Features	numFeatures	5000	Sets the maximum number of detected features. You can try increasing the **Number of Features** if the grid is not fully covered by feature points.
Patch Size	patchSize	9	Sets the patch size for feature relocalization. Try increasing the **Patch Size** if features are not consistently located on saddle points.
Feature Separation	featureSeparation	15	Sets the distribution of features in relation to each

Control (UI)	Knob (Scripting)	Default Value	Function
			other. This value should reflect the scale of a square element of the grid.
Detection Threshold	detectionThreshold	100	Sets the detection threshold at which features are rejected automatically. You can increase the value to reject weaker features, such as points not on a grid.
Feature Linking			
Angle Threshold	angleThreshold	8	Sets the angle tolerance when linking neighboring features. If you find there are too many missing links between adjacent features, try increasing this value. High values can introduce ambiguity in the linking process, so adjust the **Angle Threshold** to get the best coverage of the grid.
Distance Threshold	distanceThreshold	30	Sets the distance tolerance allowed when merging neighboring links. You can increase the **Distance Threshold** to recover missing feature points after detection.

Control (UI)	Knob (Scripting)	Default Value	Function
Peak Threshold	peakThreshold	20	Sets the peak tolerance when detecting linking directions. You can decrease the **Peak Threshold** to improve feature linking if the grid image does not contain a sufficient contrast.
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	Click to estimate the distortion model parameters using the detected grids. The solver attempts to warp the distorted links into straight lines. **Note:** 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.
Reject	deleteOutliers	N/A	Click to reject links for which

Control (UI)	Knob (Scripting)	Default Value	Function
			the residual error is outside the error **Threshold**. You can delete outliers drawn red in the overlay and then click **Solve** again to improve the results by refining the warp. You can also delete links manually by selecting them and pressing the **Delete** or **Backspace** keyboard shortcuts. Holding **Ctrl**/**Cmd** while deleting links keeps only the selected links.
Reset	resetDistortion		Resets the distortion parameters and solve state. Deleted features and links are not restored.
Solve Error	solveError	0	Displays the root mean square (RMS) solve error in pixels. 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.
Threshold	errorThreshold	10	Sets the error threshold for outliers rejection. Lower values can produce a closer fit, but with the risk of

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	Selects what to display in the overlay: • **None** - disables the overlay. • **Features** - only displays detected feature points. Only features are editable in this mode. Deleting a feature does not delete any associated links. • **Links** - only display the links between feature points. Only links are editable in this mode. Deleting a link does not delete the features it connects. • **All** - displays both feature points and links. When this option is selected, both types can be edited at the same time.
Advanced Tab			
Fisheye			
Projection Model	projection	None (Rectilinear)	Sets the projection type, either **None (Rectilnear)** or **Fisheye**. **Fisheye** offers several sub-types:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Stereographic** • **Equidistant** • **Equisolid** • **Orthographic**
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 **Direction** and **Bending** 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 **Preset** alters the selection as appropriate: • **Radial Standard** • **Radial Asymmetric** • **Radial-Tangential** (Coupled or Uncoupled)
Order	distortionOrder	0,2	Sets the order of the radial distortion's rational polynomial function. The first term controls the

Control (UI)	Knob (Scripting)	Default Value	Function
			numerator order and the second controls the denominator order. **Note:** The default values (0, 2) correspond to the legacy NukeX model.
Exponent	distortionExponent	2,2	Sets the base exponent of the radial distortion polynomial. The first term controls the numerator exponents and the second controls the denominator exponents. **Note:** A base exponent of 2 for the denominator corresponds to the classic NukeX model.
Direction	distortionModelDirection	Forward	Set the distortion model direction: • **Forward** - estimated directly but needs to be inverted for image rendering. The **NukeX Classic** model is an example of a

Control (UI)	Knob (Scripting)	Default Value	Function
			Forward model. • **Backward** - 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. The **CaraVR Radial** model is an example of a **Backward** model.
Normalisation	normalisationType	Maximum	Sets how the focal length and distortion parameters are normalized: • **Width** • **Height** • **Diagonal** • **Maximum**
Distort in Fisheye Space	distortInFisheyeSpace	enabled (if a fisheye Projection Model is selected)	When the **Project Model** is set to **Fisheye**, this control determines whether to remove or apply the distortion in fisheye or rectilinear space, that is, before or after 'defishing' the lens.
Equation x	distortionModelDisplayX	xu = xd / (1 + k0 * rd^2 + k1 * rd^4)	Distortion model equation display. Legend: (xd, yd) are the distorted cartesian coordinates, (rd, phid) are

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	yu = yd / (1 + k0 * rd^2 + k1 * rd^4)	Distortion model equation display. 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.
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 **LenDistortion** 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 **LensDistortion** tab.
Centre	centreLink	0,0	Sets the position of the distortion center. This control is linked to the control of the same name on the **LenDistortion** tab.
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.

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	Select the type of tracked camera movement: • **free move** - 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 **Point 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 **Point 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. You can also click **generate axis** to make a 3D Axis object with this position. • **nodal** - this ignores **Point B** and **Point C**. Instead, it just puts **Point A** a fixed distance in front of the camera, using the Camera's focal length to decide the distance.
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 **Point A** is set to.
set frame	N/A	N/A	Click to set **Point A** 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 **Point B** is set to.
set frame	N/A	N/A	Click to set **Point 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 **Point C** is set to. You can leave the **point ref time** set to zero to omit **Point C** from the computation. You might want to do this if you have a free moving camera but you only want to use **Point A** and **Point B** in the calculation.
set frame	N/A	N/A	Click to set **Point C** 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 **point2d** 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	**3D point** 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. 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 **XY output** and **XYZ output** 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 **img** input.
XYZ output	outputxyz	0, 0, 0	The x, y, and z values of the point in 3D space, transformed by the **axis** 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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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 **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
motionblur	motionblur	0	Sets the number of motion blur samples. A value of 1 should produce reasonable results for most sequences. 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.
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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - open the shutter at the time you specify.

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 **shutter offset** control is set to **custom**, 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	Select how to resize the image: • **to format** - Set the output width and height to the selected format. Choose the format in the **output format** dropdown menu. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated on the **Project Settings** dialog. • **to box** - Set the output width and height to dimensions you define (in pixels). Enter values in the **width/height** and **pixel aspect** fields to specify the dimensions. This option is useful for creating a thumbnail of the input image. • **scale** - Set the output width and height to a multiple of the input size. Use the **scale** slider to define the factor.

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 **resize type**.
output format	format	root.format	The format to which you want to output the image sequence. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated in the **Project Settings**. This control is only available if you have set **type** to **to format**.
width/height	box_width	200	The output width for your image. The units are in pixels. This control is only available if you have set **type** to **to box**.
	box_height	200	The output height for your image. The units are in pixels. This control is only available if you have set **type** to **to box**.
force this shape	box_fixed	disabled	When enabled, the output image matches the **width**/**height** fields exactly, even if the original image is a different shape. To achieve this, one direction gets either clipped or padded. When disabled, the output image is approximately the same shape as the original, rounded to the nearest integer number of pixels.

Control (UI)	Knob (Scripting)	Default Value	Function
			This control is only available if you have set **type** to **to box**.
pixel aspect	box_pixel_ aspect	1	Sets the pixel aspect ratio for the output image. This control is only available if you have set **type** to **to box**.
scale	scale	1	The scale factor for the width and the height. To scale each direction separately using different scale factors, click the **2** button. This control is only available if you have set **type** to **scale**.
resize type	resize	width	Choose the method by which you preserve or override the original pixel aspect ratio. Select: • **none** - to not resize the original. • **width** - 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. • **height** - 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. • **fit** - 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. • **fill** - 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. • **distort** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
center	center	enabled	When enabled, Reformat translates the image to center it in the output. When disabled, Reformat translates the image so that the lower left corners line up.
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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
preserve bounding box	pbb	disabled	When enabled, pixels outside the output format are preserved. When disabled, pixels outside the output format are clipped off.

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 **Project** and **Format** selected.

Control (UI)	Knob (Scripting)	Default Value	Function
SphericalTransform Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Input			
Projection	projTypeInput	LatLong	Sets the input projection type from which to convert. The type you select is dependent on what directional information your textures contain. For example, **Cube** has +X,+Y,+Z -X,-Y,-Z • **LatLong** - the most common full 360 frame projection. Many VR pipelines use latlongs for both ingest and export due to their simplicity and wide use.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Cubemap** - another full 360 projection. Each of the six faces is essentially rectilinear, so the data can be more familiar to work in. • **Rectilinear** - a partial frame, standard projection you're most likely familiar with. When you're going to or from rectilinear, you're only able to cover part of the frame (up to virtually 180 degrees). • **Fisheye** - 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 **Rectilinear** projection type. • **MirrorBall** - A reflective ball, scaled up to fill the available area.
Format	packingTypeInput	Image	Sets how faces in the input cubemap are displayed: • **Image** • **Views** • **Faces** **Note:** The **Format** control is only displayed when **Projection** is set to **Cubemap**.
Packing	cubemapPackingInput	LL-Cross	Sets how faces are packed in a single image: • **LL-Cross**

Control (UI)	Knob (Scripting)	Default Value	Function
			• **6x1** • **3x2** **Note:** The **Packing** control is only displayed when **Projection** is set to **Cubemap** and **Format** is set to **Image**.
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 **Sensor** and **Focal** 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	modeInput	Pan-Tilt-Roll	Sets the input rotation mode: • **Look** - adds an **directionInput** widget to the Viewer allowing you to control the input's look direction. • **From-To** - adds **fromInput** and **toInput** widgets to the Viewer allowing you to transform the input

Control (UI)	Knob (Scripting)	Default Value	Function
			by moving the widgets around. • **Pan-Tilt-Roll** - allows you to transform the input using the **Pan Tilt Roll** controls. • **Rotation Angles** - allows you to rotate the input using the **Rotation Order** and **Rotation Angles** controls.
Pan Tilt Roll	panTiltRollInput	0, 0, 0	When **Rotation** is set to **Pan-Tilt-Roll**, allows you to transform the input manually.
Output			
Projection	projTypeOutput	LatLong	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, **Cube** has +X,+Y,+Z -X,-Y,-Z • **LatLong** - the most common full 360 frame projection. Many VR pipelines use latlongs for both ingest and export due to their simplicity and wide use. • **Cubemap** - another full 360 projection. Each of the six faces is essentially rectilinear, so the data can be more familiar to work in. • **Rectilinear** - a partial frame, standard projection you're most likely familiar with. When you're going to or from rectilinear, you're only able to cover part of the frame (up to virtually 180 degrees). • **Fisheye** - covers a number of

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **Rectilinear** projection type. • **MirrorBall** - A reflective ball, scaled up to fill the available area.
Format	packingTypeOutput	Image	Sets how faces in the output cubemap are displayed: • **Image** • **Views** • **Faces** **Note:** The **Format** control is only displayed when **Projection** is set to **Cubemap**.
Packing	cubemapPackingOutput	LL-Cross	Sets how faces are packed in a single image: • **LL-Cross** • **6x1** • **3x2** **Note:** The **Packing** control is only displayed when **Projection** is set to **Cubemap** and **Format** is set to **Image**.

Control (UI)	Knob (Scripting)	Default Value	Function
Note: The **Focal** to **Shift** controls are only available when **Projection** is set to **Rectilinear** or **Fisheye**.			
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 **Sensor** and **Focal** 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: • **Look** - adds an **directionInput** widget to the Viewer allowing you to control the look direction. • **From-To** - adds **fromOutput** and **toOutput** widgets to the Viewer allowing you to transform the rig by moving the widgets around. • **Pan-Tilt-Roll** - allows you to transform the output using the **Pan Tilt Roll** controls. • **Rotation Angles** - allows you to rotate the output using the **Rotation Order** and **Rotation Angles** controls.
Pan Tilt Roll	panTiltRollOutput	0, 0, 0	When **Rotation** is set to **Pan-Tilt-Roll**, allows you to transform the output

Control (UI)	Knob (Scripting)	Default Value	Function
			manually.
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** -

Control (UI)	Knob (Scripting)	Default Value	Function
			remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
Format	formatMode	To Scale	Sets which format to use or how to compute it starting from the input: • **To Format** - force the specified input format as the output format. When using camera type projections, such as **Rectilinear**, the **sensor size y** parameter is ignored. • **To Width** - the output format has the specified input width, but the height is computed according to the output **Projection** format ratio. • **To Scale** - the output format width is computed from the input format width, and the height is computed according to the output **Projection** format ratio.
Width	scale	1	Sets the scaling factor to convert input width to output width.
Output Format	output	root.format	When **Format** is set to **To Format**, specifies the output format used.

Control (UI)	Knob (Scripting)	Default Value	Function
AdjustBBox	adjustBBox	0	Increases the size of the output image bounding box. 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 **Input** and **Output** control settings.
CaraVR Options			
Metadata	metaDataOperation	Ignore	Sets how incoming metadata is handled: • **Ignore** - any metadata present in the stream is passed downstream unaltered. • **Apply** - rotates the image according to the metadata in the stream and the total transform described by the controls in the C_SphericalTransform node. **Note:** This option assumes that the incoming image is in LatLong space. • **Transform** - 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.
Export	exportMenu	C_SphericalTransform (Inverted Linked)	Sets the export nodes to add to the Node Graph: • **C_SphericalTransform (Inverted**

Control (UI)	Knob (Scripting)	Default Value	Function
			Linked) - creates an expression linked C_SphericalTransform set to invert the current transforms. This can be useful when switching between rectilinear and latlong to perform VFX tasks, such as roto. • **C_SphericalTransform (Concatenated)** - sets the current C_SphericalTransform node to **Input+Output** mode and creates a second C_SphericalTransform node in **Input** mode. This can be used to create incremental latlong rotations without introducing unnecessary filtering hits by passing only metadata downstream until the final C_SphericalTansform in the node tree performs the concatenated rotation.
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	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. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
SplineWarp Tab			
channels	channels	all	The warp effect is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels. **Note:** There is no need to include the output mask channel in this layer.
premultiply input	premultiply	disabled	When enabled, premultiply the input channels by a mask from the combined **cookie cutter** shapes prior to warping. This control uses the same mask as **output mask** but may be used without assigning an **output mask** channel.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This control can only be enabled when the **curves** list contains shapes designated as **cookiecutters**.
output mask	outputMask	mask_ splinwarp.a	Sets the channel to be replaced by a mask from the combined cookie cutter shapes. **Note:** This control can only be enabled when the **curves** list contains shapes designated as **cookiecutters**.
crop to format	crop_to_ format	enabled	When disabled, the input image is not cropped to the **Project Settings** > **full format size**. As a result, warping can introduce pixels from the image outside the format size, rather than black. **Note:** Disabling **crop to format** 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. This boundary can be tightened by increasing **boundary curve resolution** on the **Render** tab.
output	output	source warped	Controls what output is displayed in the Viewer: • **A** - the A input image. • **A warped** - the warped A input image. • **B** - the B input image. • **B warped** - the warped B input image. • **AB morph** - the morphed image, controlled by the **warp** and **mix** controls.

Control (UI)	Knob (Scripting)	Default Value	Function
mix	mix	0	Dissolves between the source image (at 0) and the destination image (at 1). **Note:** This control is only enabled when output is set to **AB morph**.
root warp	root_warp	1	Sets the global warp multiplier for all shape pairs and layers in the **curve**s list. For AB pairs, **root warp** determines the warp where the A image is warped towards B by the warp amount. B is warped towards A by 1-warp.
layer warp	layer_warp	1	Sets the warp multiplier for all selected layers in the **curves** list. **Note:** This control is disabled when anything other than **layers** are selected in the **curves** list.
pair warp	pair_warp	1	Sets the warp multiplier for the selected pairs of shapes in the **curves** list. 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. **Note:** This control is disabled when anything other than paired shapes are selected in the **curves** list.
spline key	key	0, 0	Controls spline keyframes: • **keys** - displays the current and total number of keyframes. • - browse to the previous and next keyframe.

Control (UI)	Knob (Scripting)	Default Value	Function
			• - add or remove a keyframe on the current frame. **Note:** If Viewer tools **auto** is enabled, any changes to the splines are automatically set as keyframes at the current frame.
curves list	curves	N/A	Shows the hierarchy of shapes and groups, allowing you to adjust them and how they're displayed in the Viewer: • **Name** - Double-click to edit the shape or group Name. • **Pairing** - Displays the pairing relationship between shapes. • **Type** - Displays which input shapes exist in A, B, or AB. • - Designates the shape or layer as **transform linked** to another shape or layer. Entries linked this way are affected by transforms applied to transform source. • - Designates the shape as a **cookie cutter** for the **premultiply** and **output mask** controls. • - Whether the shape or layer is visible and rendered or not. • - Lock or unlock the shape or layer. • - Set the color in which you want the outline of your shape to appear in the Viewer. • - Toggles whether or not the current shape is a hard boundary (removes warping outside the shape). • - Indicates whether or not the current shape is a

Control (UI)	Knob (Scripting)	Default Value	Function
			boundary (limits warping). Use the shape list to: • Select multiple items to adjust attributes on all the selected list items. • Drag and drop to re-order or move items between layers. • Right-click for a context menu containing **Addnewlayer** and shape editing functions such as **Copy**, **Paste**, and **Duplicate**.
Transform Tab			
translate xy	translate	0, 0	Translates the selected curves on the x and y axes. Alternatively, you can drag on an axis on the transformation overlay in the Viewer.
rotate	rotate	0	Rotates the selected curves around the **center xy** coordinates. Alternatively, you drag the transformation overlay in the Viewer.
scale	scale	1	Scales the selected curves' width and height.

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): • XY • YX
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. Warps 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. **Note:** 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.
boundary curve resolution	boundary_ curverez	3	Adjusts the number of interpolated points on **boundary** and **hard boundary** 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	Sets the type of warp function to use: • **disabled** - uses an updated quadratic warp function that copes well with overlapping control points, but has a more local warp effect. • **enabled** - 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, **Classic warping** produces a more linear warp between points, which may produce better results when using a cookie cutter mask to cut out the warped image.
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.

Stablilize

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	An optional image to use as a mask. By default, the distortion 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
STMap Tab			
channels	channels	all	The distortion is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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 **none**.
	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 **none**.
	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 **UV** and **blurchannels** have been premultiplied by the alpha channel, such as when output by a renderer.
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.

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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels

Control (UI)	Knob (Scripting)	Default Value	Function
			receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** 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 **track** 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 **x** coordinates of the associated **track** anchor's center.
track_y	N/A	Dependent on source input	Adjusts the **y** coordinates of the associated **track** 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. 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.
offset_y	N/A	0	
T	N/A	enabled	When enabled, translation is calculated during tracking.
R	N/A	disabled	When enabled, rotation is calculated during tracking. **Note:** Tracking rotation requires at least two tracks.
S	N/A	disabled	When enabled, scale is calculated during tracking. **Note:** Tracking scale requires at least two tracks.

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)	Sets the node to output when you click **create**. The **baked** options do not use expression links between Tracker and the exported node: • **CornerPin2D (use current frame)** - creates an expression linked CornerPin2D node that warps the image according to the relative transform, using the current frame as a reference. • **CornerPin2D (use transform ref frame)** - creates an expression linked CornerPin2D node that warps the image according to the relative transform, using the frame specified in the **Transform** tab as a reference. • **Transform (stabilize)** - creates an expression linked Transform node with control presets to stabilize the clip. • **Transform (match-move)** - creates an expression linked Transform node with control presets to match-move the clip.
create	createCornerPin	N/A	Click to create the CornerPin2D or Transform node specified in **Export** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: There must be 4 tracks selected in the **Tracks** list to create a CornerPin2D node.
Settings Tab			
General			
track channels	channels	rgb	Tracking only occurs in these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
pre-track filter	pretrack_filter	median	Sets the filter applied before image patches are compared: • **none** - no filter is applied. • **adjust contrast** - 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. • **median** - attempts to remove image noise.
adjust for luminance changes	adjust_for_ luminance_changes	disabled	When enabled, Tracker does some extra pre-filtering to compensate for changes in brightness. 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. **Note:** Enabling **adjust for luminance changes** can occasionally produce better tracks on shots with no differences in luminance, particularly on jittery shots where sub-pixel accuracy is vitally important.

Control (UI)	Knob (Scripting)	Default Value	Function
max iterations	max_iter	100	Sets the maximum number of iterations before the tracking algorithm stops searching for features. **Note:** This setting does not normally need adjusting.
epsilon / resolution	epsilon	0.01	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. **Note:** This setting does not normally need adjusting.
max_error	max_error	0.2	Sets the error level at which Tracker stops searching for features.
clamp super-white, sub-zero footage	clamp_footage	enabled	When enabled, tracked patches are clamped to values between 0-1. **Note:** If you want to track using the full dynamic range available in your footage, disable this control and adjust the **max-error** value accordingly. For example, images with pixel intensity 40 may require a max-error value of 40.
show error on track paths	show_error_on_track_links	disabled	When enabled, keyframes on the track are colored according to their relative error: • **green** - a good match for the grabbed pattern. • **amber** - a reasonable match for the grabbed pattern. • **red** - a poor match for the grabbed pattern.

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	Sets when the zoom window is visible in the Viewer: • **always** - the zoom window is always visible. • **on track change** - only display the zoom window when a track changes. • **when tracking** - only display the zoom window during tracking. • **when tracking or track change** - only display the zoom window during tracking or when a track changes. • **never** - the zoom window is never displayed.
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	Sets when filtering is applied to the zoom window: • always • on playback

Control (UI)	Knob (Scripting)	Default Value	Function
			• never **Note:** The filter applied is the same as that selected on the **Transform** tab, and can produce a more visually stable track. It can make track positioning more difficult, however.
Auto-Tracking			
predict track	predict_track	disabled	When enabled, use the current tracker animation path to determine where to look in the next frame. **Note:** If Tracker fails to find the feature in the next frame, click the **clearfwd** button above the Viewer before continuing, or the same error is repeated.
warp type	warp	Translate	Selects the transformations that are tried on the pattern to match it to the image. **Translate** is fastest, but may lose the track if the pattern rotates, scales, or shears over the course of the track: • **Translate** - only expect pattern translation. • **Translate/Rotate** - expect pattern translation and rotation. • **Translate/Scale** - expect pattern translation and scaling. • **Translate/Rotate/Scale** - expect pattern translation, rotation, and scaling. • **Affine** - expect straight lines and the distance between the points on them to remain equal.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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	Sets when the tracker attempts to grab a new pattern: • **on first frame** - grab a pattern on the first frame only. • **every frame** - grab a new pattern on every frame. • **every n frames** - use the **every n frames** control to specify the frame interval. • **if error above** - use the **when error >** control to specify the grab behavior. • **if error below** - use the **when error <** control to specify the grab behavior. • **custom** - use the **every n frames** and **when error <>** controls to specify grab behavior.
every n frames	grab_interval	0	When **pattern grab behavior** is set to **update every n frames** or **custom**, sets the interval at which Tracker automatically re-grabs a pattern.
when error >	grab_error_above	0.05	When **pattern grab behavior** is set to **update if above tolerance** or **custom**, sets the error level above which Tracker automatically re-grabs a pattern.
when error <	grab_error_below	0	When **pattern grab behavior** is set to **update if below tolerance** or **custom**, 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	When enabled, auto-tracking deletes manual keyframes. When disabled, auto-tracking adjusts the position of manual keyframes.
keyframe display	keyframe_display	scroll, single line only	Sets how keyframe snapshots are displayed in the Viewer: • **all** - show all keyframe snapshots in the available Viewer space. • **nearest, single line only** - show the nearest keyframe snapshot to the playhead, and the surrounding whole snapshots, on a single line only. • **scroll, single line only** - show all keyframe snapshots in a scrolling, single line only. • **none** - don't show any keyframe snapshots.
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	Sets the maximum number of tracks with keyframes that can be displayed in the Viewer. Set this control to **0** to always display selected tracks with keyframes.
Transform Tab			
transform	transform	none	Sets the type of transform to apply. **Note:** The **transform** control must be set to **none** when calculating tracks. • **none** - no transformation is applied to the input image. • **stabilize** - transforms the image so that the tracked points do not move. • stabilize 1pt - similar to stabilize, but designed for use with a single track. • **match-move** - transforms another image so that it moves to match the tracked points. • **match-move 1pt** - similar to match-move, but designed for use with a single track. • **remove jitter** - transforms the image so that the tracked points move smoothly, with high-frequencies removed. • **add jitter** - transform the input image by the high-frequency components of the track to increase the shake or add it to another image.
reference frame	reference_frame	1	When **transform** is set to **stabilize** or **match-move**, sets the frame in the input sequence to use as the reference or identity frame.
set to current frame	N/A	N/A	Click to set the current frame as the reference or identity frame.

Control (UI)	Knob (Scripting)	Default Value	Function
jitter period	jitter_period	10	When **transform** is set to **add/removejitter**, 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 **translation** applied to the **Transform** 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 **rotation** applied to the **Transform** 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 **scale** applied to the **Transform** 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 **skew** applied to the **Transform** 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 **skew** applied to the **Transform** 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: • **XY** • **YX**
center xy	center	Dependant on input	Sets the center of rotation and scaling. You can also **cmd** + drag the **Transform** 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some

Control (UI)	Knob (Scripting)	Default Value	Function
			smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
motionblur	motionblur	0	Sets the number of motion blur samples. A value

Control (UI)	Knob (Scripting)	Default Value	Function
			of 1 should produce reasonable results for most sequences. 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.
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: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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 **center x y** 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 **center x y** 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: • XY • YX
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 **translate xy**, **rotate**, **scale**, **skew**, or **center xy** 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
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
			sequences. 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.
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: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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	An optional image to use as a mask. By default, the transform 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Transform Tab			
channels	channels	all	The transform is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
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: • XY • YX
center xy	center	N/A	The center of rotation and scaling. You can also move it using **Ctrl/Cmd**+drag.
invert	invert_matrix	disabled	When enabled, any transform you applied using the **translate xy**, **rotate**, **scale**, **skew**, or **center xy** 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
clamp	clamp	disabled	When using filters that employ sharpening, such as **Rifman** and **Lanczos**, you may see a haloing effect. If necessary, check **clamp** to correct this problem.
black outside	black_outside	enabled	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. In most cases, you should keep **black outside** 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. **Note:** Enabling **black outside** also adds a solid alpha covering the input image area if no alpha is present.
motionblur	motionblur	0	Sets the number of motion blur samples. A **motionblur** value of 1 should produce reasonable

Control (UI)	Knob (Scripting)	Default Value	Function
			results for most sequences. Increase the **motionblur** value to produce more samples for higher quality, decrease it to shorten the processing time.
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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - 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.
	shuttercustomoffset	0	If the **shutter offset** control is set to **custom**, 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 **none**.
	maskChannelInput	none	The channel to use as a matte. By default, he transform is limited to the non-black areas of this channel.
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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	An optional image to use as a mask. By default, the transform 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
TVIScale Tab			
channels	channels	all	The scale is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Iterations	Iterations	5	Sets the number of iterations to apply to achieve the best solution. 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.
Lambda	Lambda	5	Controls how far the filtered values are allowed to stray from the original input. The larger the value, the less smoothing is allowed and the more noise present in the original image makes it to the larger image.
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 **none**.
	maskChannelInput	none	The channel to use as a matte. By default, he transform is limited to the non-black areas of this channel.
inject	inject	disabled	Copies the **mask** input to the predefined **mask.a** 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 **.exr** files created by the node.

Control (UI)	Knob (Scripting)	Default Value	Function
VectorDistort Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU**

Control (UI)	Knob (Scripting)	Default Value	Function
available			specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
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 **From1-4** values to the **To1-4** values.
Bake Corners	bakeCorners	N/A	Click to calculate the position of the pins for each frame specified in the **Render** 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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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 **To1-4** values to the **From1-4** values.
SmartVector Tab			
Frame Distance	frameDistance	1 frame	Sets the trade-off between warping things well for nearby frames against frames further away. Each shot has its own optimum **frame distance** value so try several values to see what produces the best results. For example, warping up to 20-30 frames away from the reference frame, or sequences with rapid motion, typically require values closer to **1 frame**. Warping over 100 frames away, or sequences with slower motion, typically require values closer to **64 frames**.

Control (UI)	Knob (Scripting)	Default Value	Function
Output	outputMode	warped src	Sets the type of output produced by VectorCornerPin: • **warped src** - output the warped **Source** input using the reference frame as a template for warping the rest of the sequence. • **st-map** - 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. • **st-map inverse** - output the inverse st-map for the warp, that is, the warp from the current frame to the reference frame.
Blur Size	blurSize	0	Controls the amount of blur applied to the internally calculated STMap. Increasing the **blur size** can remove local distortions in the warped result, particularly in longer sequences.
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.

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 **.exr** files created by the node.

Control (UI)	Knob (Scripting)	Default Value	Function
VectorDistort Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
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	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. When disabled, the current frame is warped instead of the reference frame.
Frame Distance	frameDistance	1 frame	Sets the trade-off between warping things well for nearby frames against frames further away. Each shot has its own optimum **Frame Distance** value so try several values to see what produces the best results. For example, warping up to 20-30 frames away from

Control (UI)	Knob (Scripting)	Default Value	Function
			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. **Note:** The maximum value for this control is passed down the node tree from a SmartVector node's **frame distance** control.
Output			
Output	outputMode	warped src	Sets the type of output produced by VectorDistort: • **warped src** - output the warped **Src** input using the reference frame as a template for warping the rest of the sequence. • **st-map** - 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. • **st-map inverse** - output the inverse st-map for the warp, that is, the warp from the current frame to the reference frame.
Blur Size	blurSize	0	Controls the amount of blur applied to the internally calculated STMap. Increasing the **blur size** can remove local distortions in the warped result, particularly in longer sequences.
Channels	channels	rgba	Sets the channels to which the warp is applied.
Filter	imageFilter	Cubic	Select the filtering algorithm to apply the warp to the image, similar to that of the filters used in the IDistort and STMap nodes. • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing,

Control (UI)	Knob (Scripting)	Default Value	Function
			plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.

New 3D System Nodes

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.

Note: Some nodes remain in Beta and are marked with a Beta tag in the menu and node Properties. While we welcome feedback on these nodes, they are still under development and are not production ready and should not be used in production.

Note: For those who are looking to transition from the **Classic 3D System** to the **New 3D System**. See this helpful guide which provides a comparison of nodes, matching them by equivalent function and purpose - 3D System Nodes: From Classic to New.

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.

To learn more about the workflow, see Using Axis Node in Your Scene.

Note: Axis's classic 3D system equivalent is also named Axis. For New 3D System scenes, make sure you are adding the New 3D System node (found in right click node menu under **3D** > **3D**, not the Classic one **3D** > **3D Classic**).

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. 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.
	look at	Look At constrain input allows your constrained prim to always face and look at the target prim you are constraining to and functions much like the LookAt input pipes in the classic system. Edit the **Constrain** > **Type** to change the input pipe to Parent, Transformation, Translation, Rotation, or Scale.

Control (UI)	Knob (Scripting)	Default Value	Function
Axis Tab			
Live Read	read_from_scene_link	on	If enabled, read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the Axis node- this can then be copied and used elsewhere.
Snapshot Range	snapshot_	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
	range_link		passed through and bake the data from a frame range onto the Axis node- this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location to load the prim.
Constrain			
Apply Constrain to Local Parent TRS	local_parent_constrain_enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the

Control (UI)	Knob (Scripting)	Default Value	Function
			prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Parent Xform Sync	sync_local_ parent	on	If enabled, extract the prim's parent Xform. If the 'Combine With Parent' control is enabled this control is ignored.
Parent Translate	local_parent_	0, 0, 0	Applies translation prior to the local transform allowing

Control (UI)	Knob (Scripting)	Default Value	Function
	translate		a parenting hierarchy to be kept separate from the local transform. The transform is applied in fixed SRT transform order and XYZ rotation order. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Rotate	local_parent_rotate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Scale	local_parent_scale	1, 1, 1	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_combine_enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs. When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.

Control (UI)	Knob (Scripting)	Default Value	Function
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/ Export Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the Axis node- this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
			passed through and bake the data from a frame range onto the Axis node- this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location to load the prim.
Import From File	file_source_enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's attribute data will be 'live' pulled into the node's parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them. The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Objects/Axis1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Axis1**.
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene

Control (UI)	Knob (Scripting)	Default Value	Function
			graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
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.

BasicSurface

The BasicSurface node combines diffuse, specular, and emission controls, allowing you to adjust all three aspects of the material from a single properties panel.

See more about the workflow at BasicSurface Shader.

Tip: BasicSurface's classic 3D system equivalent is the BasicMaterial node.

Tip: Use BasicSurface's ray visibility and indirect illumination controls with ScanlineRender for ray-tracing.

Inputs and Controls

Connection Type	Connection Name	Function
Input	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.
	diff	An optional input for limiting the effect of the diffuse component. Any changes you make to **diffuse** are limited to the non-black areas of the mask.
	emis	An optional input for limiting the effect of the emissive component. Any changes you make to **emission** are limited to the non-black areas of the mask.
	spec	An optional input for limiting the effect of the specular component. Any changes you make to **specular** are limited to the non-black areas of the mask.
	rough	An optional input for varying the roughness.

Connection Type	Connection Name	Function
		Note: This input is hidden on the left side of the node.

Control (UI)	Knob (Scripting)	Default Value	Function
BasicSurface Tab			
Visibility	sides_mode	both-sides	Choose whether material is visible for **both-sides**, **front-side** or **back-side** faces. Also toggle: **Camera** - material is visible to camera rays **Shadow** - material is visible to shadow
shading channels	channels	rgb	The effect is only applied to these channels. If you set this to something other than **all** or **none**, 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 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.

Control (UI)	Knob (Scripting)	Default Value	Function
roughness	roughness	0.5	Sets the roughness value on the material.
roughness channel	shininess_ channel	luminance	Selects which channel is used to map the roughness. Choose: • **red** - use the red channel for the mapping. • **green** - use the green channel. • **blue** - use the blue channel. • **alpha** - use the alpha channel. • **luminance** - use the luminance. • **average rgb** - use the average of the red, green, and blue channels.

Camera

Cameras can be connected to the GeoScene node, the ScanlineRender node, or any node with a **cam** input. 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.

To learn more about the workflow, see Working with Cameras in the New 3D System.

Note: Camera's classic 3D system equivalent is also named Camera. For New 3D System scenes, make sure you are adding the New 3D System node (found in right click node menu under **3D** > **3D**, not the Classic one **3D** > **3D Classic**).

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. 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.
	look at	Look At constrain input allows your constrained prim to always face and look at the target prim you are constraining to and functions much like the LookAt input pipes in the classic system. Edit the **Constrain** > **Type** in the **Position** tab to change the input pipe to Parent, Transformation, Translation, Rotation, or Scale.

Control (UI)	Knob (Scripting)	Default Value	Function
Camera Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the Camera node- this camera can then be copied and used elsewhere.
Snapshot Range	snapshot_	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
	range_link		passed through and bake the data from a frame range onto the Camera node- this camera can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location to load the camera.
Projection	projection_mode	Perspective	Sets the camera projection type when projecting 2D textures: • Perspective - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture. • Orthographic - objects are viewed using parallel projection. • Spherical - the entire 360° world is rendered as a spherical map. • Cylindrical - the entire 360° world is rendered as a cylindrical map.
World to Meters	world_to_meters	1	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. Lens parameters like **Focal Length** and **Horizontal** and **Vertical Aperture** are defined in millimeters so this scale value is further divided by 1000 to get the final world-scale to millimeters scalar.
Use Scene Scale	use_scene_scale	on	Use the incoming scene world scale metadata ('metersPerUnit') when converting lens values into millimeters, which is Nuke's standard lens unit. When disabled use 0.01 default scene scale (centimeters), which will set the **World to Meters** control to 100. This control does nothing if **Live Read** is off. Converted lens values can be scaled incorrectly if scene files are written assuming the lens unit is millimeters but the scene scale (metersPerUnit) is some other unit such as meters. This is a common enough occurance

Control (UI)	Knob (Scripting)	Default Value	Function
			that a manual control is required here, as there is current no way to verify that scene world scale metadata is accurate.
Frustum			
Focal Length	focalLength	50	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 **Horizontal Aperture** value, this determines the field of view angle. Shorter focal lengths increase the field of view angle, capturing more of a given scene.
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.
Clipping Near	near	0.1	Adjusts the position, in scene units, of the camera's near clipping plane. Objects closer to the camera than this plane are not rendered. **Note:** The value for the Near clipping plane must always be positive to produce a sensible result.
Clipping 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

Control (UI)	Knob (Scripting)	Default Value	Function
			size.
Scale uv	win_scale	0	Scales the film negative.
Roll	winroll	0	Rotates the film negative (by degrees) without changing the camera axis rotation itself.
Shutter			
Length	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.
Offset	shutteroffset	start	Controls how the shutter behaves with respect to the current frame value. It has four options: • centred - centers the shutter around the frame. That is, open from f - shutter/2 to f + shutter/2. • start - opens the shutter starting at the frame. That is, open from f to f + shutter. • end - closes the shutter at the frame. That is, open from f - shutter to f. • custom - opens the shutter at the time specified by the shuttercustomoffset control.
Bias	shutter_bias	0	Biases samples toward shutter close or shutter open for stylized motion blur. 0+ range (where 0 is uniform blur).
Depth of Field			
Focus Distance	focusDistance	0	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	0	As in real world camera, fstop controls the amount of light that can reach the film negative. Only applies to depth of field rendering.
Lens Distortion			
a (r^3)	nuke_	0	Lens distortion A.

Control (UI)	Knob (Scripting)	Default Value	Function
	lensDistortA		
b (r^3)	nuke_ lensDistortB	0	Lens distortion B.
c (r^3)	nuke_ lensDistortC	0	Lens distortion C.
Position Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the Camera node- this camera can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the Camera node- this camera can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location to load the camera.
Constrain			
Apply Constrain to Local Parent TRS	local_parent_ constrain_ enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated

Control (UI)	Knob (Scripting)	Default Value	Function
			back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Translate (Parent and Transformation only)	constraint_ apply_translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.

Control (UI)	Knob (Scripting)	Default Value	Function
Transformation only)			
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Maintain Offset Frame	constraint_ maintain_offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_set_ maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Parent Xform Sync	sync_local_ parent	on	If enabled, extract the prim's parent Xform. If the 'Combine With Parent' control is enabled this control is ignored.
Parent Translate	local_parent_ translate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Rotate	local_parent_ rotate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.

Control (UI)	Knob (Scripting)	Default Value	Function
Parent Scale	local_parent_ scale	1, 1, 1	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_ xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_ combine_ enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs. When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** 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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			scene.
World Matrix			
World matrix	world_matrix	N/A	Displays the world or absolute xyz transform of the node in world coordinates. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/ Export Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the Camera node- this camera can then be copied and used elsewhere.
Snapshot Range	snapshot_range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the Camera node- this camera can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location to load the camera.
Import From File	file_source_enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's attribute data will be 'live' pulled into the node's

Control (UI)	Knob (Scripting)	Default Value	Function
			parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_ enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them. The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Cameras/Camera1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Camera1**.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
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	When off, the camera representation in the Viewer scales with the scene so that it's always visible. 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.

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	An optional input to use as a mask. By default, feature tracking is limited to the non-black areas of the mask. The **Mask** input is hidden until the **Source** input is connected.

Control (UI)	Knob (Scripting)	Default Value	Function
CameraTracker Tab			
Input			
Source	sourceType	Sequence	Sets the type of source footage you intend to track: • **Sequence** - designed to track a contiguous frame sequence with minimal intervention from you. • **Stills** - 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.
Mask	ignore	None	Set the mask type to exclude areas of the sequence when tracking: • **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the source clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the source clip to define which areas to ignore.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Mask Luminance** - use the luminance of the Mask input to define which areas to ignore. • **Mask Inverted Luminance** - use the inverted luminance of the Mask input to define which areas to ignore. • **Mask Alpha** - use the Mask input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted Mask input alpha channel to define which areas to ignore.
Range	trackRange	Input	Sets the range of frames processed by CameraTracker: • **Input** - the default value, sets the frame range to the length of the sequence attached to the Source input. • **Global** - sets the tracking frame range to the range set in the **Project Settings** > **frame range** controls. If no frame range is defined, the frame range of the first image you read in is used as the Global frame range. • **Custom** - sets a tracking range of frames described by the **from** and **to** fields. • **Reference Frames** - 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 **Add** dropdown. This option should only be used if you have set **Source** to **Stills**.
from	trackStart	Dependent on the **Project Settings**	When **Range** is set to **Custom**, this control sets the first frame to track in the footage.
to	trackStop	Dependent on the **Project Settings**	When **Range** is set to **Custom**, this control sets the last frame to track in the footage.

Control (UI)	Knob (Scripting)	Default Value	Function
Frames	referenceFrames	0	Displays the reference frames to track and solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
	addReferenceFrame	N/A	Adds the current frame to the set of frames to track and solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
	deleteReferenceFrame	N/A	Removes the current frame from the set of frames to track and solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Add	addReference-FramesMenu	Add	Allows you to quickly add reference frames: • **Add All** - Adds all frames based on the input's start and end range. Any missing frames on the input clip are skipped. • **Add Range** - Opens a dialog that lets you select a specific frame range to add. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Delete	deleteReference-	Delete	Allows you to quickly remove reference

Control (UI)	Knob (Scripting)	Default Value	Function
	FramesMenu		frames: • **Delete All** - Removes all reference frames. • **Delete Range** - Opens a dialog that lets you select a specific frame range to remove. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Camera			
Principal View	principalView	left	Sets the principal view where features are tracked and the **Mask** input is applied. The secondary camera is calculated relative to this **Principal View** camera. This control also appears on the **Settings** tab. **Note:** Principal View 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).
Camera Motion	cameraMotionLink	Free Camera	Sets the type of camera motion to compensate for: • **Rotation Only** - select this if the camera is stationary, but rotating. • **Free Camera** - select this if the camera is moving freely, rotating, and translating. • **Linear Motion** - select this if the camera motion is a straight, linear path. • **Planar Motion** - select this if the camera has a flat path, moving in a two-dimensional plane only.

Control (UI)	Knob (Scripting)	Default Value	Function
Lens Distortion	lensDistotionTypeLink	No Lens Distortion	Specifies the type of lens distortion expected: • **No Lens Distortion** - treats the footage as having no distortion. Use this option if the **Source** footage has already been corrected to remove lens distortion. • **Unknown Lens** - calculates the lens distortion automatically from the sequence (in the same way as the Image **Analysis** tab in the LensDistortion node) and then refines the distortion in the camera solve.
Undistort Input	undistort	off	When enabled, the **Source** is undistorted based on the calculated lens.
Focal Length	focalLengthType	Unknown Constant	Sets the focal length for the camera: • **Known** - select this option if the focal length is available and enter a value in the **Length** control. • **Approximate Varying** - select this option if an approximate focal length is available and enter keyframed focal length values in the **Length** control. • **Approximate Constant** - select this option if an approximate focal length is available and there is no zoom, and enter a focal length value in the **Length** control. **Note:** CameraTracker attempts to refine the focal length during the solve if you select an **Approximate** option. • **Unknown Varying** - select this option if the focal length is unknown and changing. • **Unknown Constant** - this is the default

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 **Film Back Size** (mm or inches).
Film Back Preset	filmBackSizePresets	Custom	Sets the **Film Back Size** controls automatically, depending on which preset you choose. The default setting allows you to enter your own settings manually. **Tip:** You can add your own defaults by editing the **../NukeScripts/camerapresets.py** file in the Nuke installation package.
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 **Units** dropdown. The units should match the units used for the **Length**.
Units	filmbackUnits	mm	Sets the unit of measure for the **Film Back Size**, either millimeters or inches.
Analysis			
Track	trackFeatures	N/A	Click to begin auto-tracking using the controls specified in the **Settings** 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 **Settings** tab **Tracking** 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 **Settings** 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	Click to update the solve calculation, such as when you have extended the frame range or used some of the **Settings** tab **Solving** refinement controls. 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.
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	Determines how the track and solve data is used when you click Create: • **Camera** - creates a single animated camera. • **Camera rig** - creates an animated camera for each view in the script and a JoinViews to node to pass the animation downstream. • **Scene** - creates a single animated camera, a point cloud from the solved 3D points, and a Scene node. • **Scene+** - creates a scene containing all the components included in the other create modes. • **Point cloud** - creates a point cloud from the solved 3D points. • **Distortion** - creates a LensDistortion node with **Undistort** disabled. • **Undistortion** - creates a LensDistortion node with **Undistort** enabled. • **Cards** - creates a 3D card for each solved frame in the sequence. **Note:** Creating Cards from sequences can take long time, depending on the number of frames present.
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	Sets the 3D system with which the **Export** nodes are compatible: When enabled, clicking the **Create** button adds the selected new 3D system nodes to the Node Graph. New 3D system nodes are red by default. When disabled, clicking the **Create** 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 **Project Settings**	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. 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).
[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 **Project Settings**	Sets the view for the track curves. 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).
[track curves]	trackCurves	N/A	Displays the following track and solve information in the form of curves: • **num tracks** - the number of tracked features at each frame. • **track len - min** - the minimum length of the tracks at each frame (in frames).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **track len - avg** - the average length of the tracks at each frame (in frames). • **track len - max** - the maximum length of the tracks at each frame (in frames). • **Min Length** - the threshold for minimum track length. You can adjust the minimum using the Min Length control. • **Solve Error** - displays the constant Solve Error parameter. • **error min** - the minimum reprojection error at each frame (in pixels). • **error rms** - the root mean reprojection error at each frame (in pixels). • **error track** - the maximum root mean reprojection error calculated over the track lifetime at each frame (in pixels). • **error max** - the maximum reprojection error at each frame (in pixels). • **Max Track Error** - displays the constant Max RMS Error parameter. You can adjust the maximum using the **Max Track Error** control. • **Max Error** - displays the Max Error threshold parameter. You can adjust the maximum using the **Max Error** control.

Control (UI)	Knob (Scripting)	Default Value	Function
Min Length	minLengthThreshold	0	Redefines your thresholds if you find your solve or camera output needs adjusting: • **Min Length** - 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. • **Max Track Error** - reduce this threshold to reject tracks based on RMS reprojection error. • **Max Error** - reduce this threshold to reject tracks with a large reprojection error in isolated frames.
Max Track Error	maxRMSEThreshold	0	
Max Error	maxErrorThreshold	0	**Note:** Feature tracks that fall within the threshold limits are called inliers, and are used when you recalculate a solve instead of starting from scratch.
Refinement			
Refine Solve	refineSolve	N/A	Click to attempt to refine the solve calculation using the methods outlined in the **Focal Length**, **Position**, and **Rotation** controls.
Focal Length	refineOptions	off	When enabled, clicking **Refine Solve** causes CameraTracker to finess the solve calculation using an updated **Focal Length**.
Position	refineOptions	off	When enabled, clicking **Refine Solve** causes CameraTracker to finess the solve calculation using an updated camera position.
Rotation	refineOptions	off	When enabled, clicking **Refine Solve** 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	Sets the principal view where features are tracked and the **Mask** input is applied. The secondary camera is calculated relative to this **Principal View** camera. This control also appears on the **CameraTracker** tab. **Note:** Principal View 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).
Camera Motion	cameraMotion	Free Camera	Sets the type of camera motion to compensate for: • **Rotation Only** - select this if the camera is

Control (UI)	Knob (Scripting)	Default Value	Function
			stationary, but rotating. • **Free Camera** - select this if the camera is moving freely, rotating, and translating. • **Linear Motion** - select this if the camera motion is a straight, linear path. • **Planar Motion** - select this if the camera has a flat path, moving in a two-dimensional plane only.
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 **Set reference frame** 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 **Project Settings**, 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	Sets a known interaxial distance for stereo views to define the scene scale. 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).
Constant Interaxial Covergence	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	When enabled, cone shaped 3D markers are displayed on your points in the 3D Viewer. **Note:** When **Show 3D marker** is enabled, set the size of the markers using the scale controls.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the scene is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the scene is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the scene is snapped to a new position, orientation, and size depending on the points selected.
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 **Ctrl/Cmd** and dragging in the 3D Viewer.
scale xyz	scale	0,0,0	Scales the scene around the x, y, and z axes. You can adjust scale values by holding down **Ctrl/Cmd**+**Shift** and dragging in the 3D Viewer. **Note:** This control is only displayed if you've scaled the scene on individual axes.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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]	world_matrix	N/A	Displays the world or absolute xyz transform

Control (UI)	Knob (Scripting)	Default Value	Function
			of the node in world coordinates. **Note:** You can't adjust the **World matrix** manually.
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: • **No Lens Distortion** - treats the footage as having no distortion. Use this option if the **Source** footage has already been corrected to remove lens distortion. • **Unknown Lens** - calculates the lens distortion automatically from the sequence (in the same way as the Image **Analysis** tab in the LensDistortion node) and then refines the distortion in the camera solve.

Control (UI)	Knob (Scripting)	Default Value	Function
Lens Type	lensType	Spherical	Sets the lens type that CameraTracker should expect: **Spherical** or **Anamorphic**.
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 **Lens Type** is set to **Anamorphic**, defines anamorphic squeeze - the distortion in x is scaled by this amount.
Asymmetry Distortion xy	asymmetricDistortion	0,0	When **Lens Type** is set to **Anamorphic**, defines asymmetric distortion to correct for slight misalignments between multiple elements in the lens.
Undistort Input	undistort	off	When enabled, the **Source** is undistorted based on the calculated lens.
filter	filter	Cubic	When **Undistort Input** 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the

Control (UI)	Knob (Scripting)	Default Value	Function
			curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moiré patterns).
Card Parameters			
scale xyz	cardScale	1,1,1	Equivalent value for the **scale** parameter on the Card node, used to produce horizontal scale in conjunction with the **Radial Distortion** controls.
a (r^3)	a	0	Equivalent value for the **a (r^3)** control on **LensDistortion** tab of the Card node. Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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. Positive values make the card rounder, negative make the corners sharper.

Control (UI)	Knob (Scripting)	Default Value	Function
b (r^2)	b	0	Equivalent value for the **b (r^2)** control on **LensDistortion** tab of the Card node. Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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. Positive values make the card rounder, negative make the corners sharper.
c (r^1)	c	0	Equivalent value for the **c (r^1)** control on **LensDistortion** tab of the Card node. Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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 Positive values make the card rounder, negative make the corners sharper.

ConstantShader

The ConstantShader node is used to apply a material with constant color to a prim. ConstantShader has no inputs.

To learn more about the workflow, see ConstantShader: Color.

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	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). Depth can only be calculated where the real world 3D position of objects doesn't change. If there are moving objects in your **Source** footage, DepthGenerator is likely to struggle to create an accurate depth map for those regions. To prevent this, you can exclude moving

Connection Type	Connection Name	Function
		foreground regions from the depth calculation by connecting a matte to this input and setting **Ignore Mask** in the DepthGenerator properties to the channel that contains the matte. The **Mask** input only appears once you've connected the other two inputs.
	Camera	A tracked Camera that matches the Source footage. If necessary, you can create one using the CameraTracker 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	Sets the mask type to exclude areas of the **Source** footage during depth calculation. DepthGenerator expects values of either 0 (for regions to use) or 1 (for regions to ignore). Depth can only be calculated where the real world 3D position does not change. If your **Source** footage includes moving foreground objects, it's a good idea to supply a mask to prevent distortion in moving regions: • **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the **Source** clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the **Source** clip to define which areas to ignore. • **Mask Luminance** - use the luminance of the **Mask** input to define which areas to ignore. • **Mask Inverted Luminance** - use the inverted luminance of the **Mask** input to define which areas to

Control (UI)	Knob (Scripting)	Default Value	Function
			ignore. • **Mask Alpha** - use the **Mask** input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted **Mask** input alpha channel to define which areas to ignore. Alternatively, you can try using a smaller **Frame Separation** to capture moving objects.
Output			
Depth Output	outputType	Depth (1/Z)	Sets the type of output produced: • **Depth 1/Z** - output 1/Z where Z is the distance along the camera Z axis. This matches the depth output of the ScanlineRender node. • **Distance** - output the distance along the ray from the camera center to the 3D surface point.
Create Card	createCard	N/A	Click to create a group containing a displaced Card to visualize depth as a surface in 3D space. **Note:** The **DepthOutput** control must be set to **Depth (1/Z)**.
Surface Point	P_channel	none	Sets the channel(s) to output depth as a position pass. The position pass includes the X, Y, and Z coordinates for each pixel in the image. You can use it with the

Control (UI)	Knob (Scripting)	Default Value	Function
			Relight node, or with the PositionToPoints node to visualize depth as a 3D point cloud.
Surface Normal	N_channel	none	Sets the channel(s) to output depth as a normals pass. Use the **NormalDetail** control to affect the smoothness of the normals pass. 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 Relight node.
Frame Separation			
Analyze Sequence	analyzeSequence	N/A	Click to automatically calculate the **FrameSeparation** to use in the sequence. For this to work, the camera in the **Camera** input must be defined for all frames within the frame range. **Note:** If you analyze the sequence and only then decide to add an ignore mask, you should analyze the sequence again after adding the mask.
Analyze Frame	analyzeFrame	N/A	Click to calculate the **Frame Separation** to use at the playhead frame. This gives you more control than **Analyze Sequence**, as you can work through the timeline, analyze particular frames, and if necessary tweak the **Frame Separation** value manually. The camera in the **Camera** input must be defined for all frames within the frame range.
Frame	frameSeparation	1	Adjusts the offset between the current frame and the

Control (UI)	Knob (Scripting)	Default Value	Function
Separation			frame against which to calculate depth for your input. Use a small separation value for fast camera moves and a larger value for slow camera moves. 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. Animate the **FrameSeparation** to compensate for variable camera speeds. The camera in the **Camera** input must be defined for all frames within the frame range. **Note:** The **Analyse Sequence** and **Analyse Frame** buttons attempt to calculate the best separation.
Calculated Accuracy	accuracy	N/A	Displays the depth accuracy calculated when analyzing frame separation. Values closer to 1 are considered accurate, and values closer to 0 inaccurate. Use frames with a high accuracy when placing elements in 3D (for example, by clicking **Create Card** or using a PositionToPoints node). If you're not getting accurate depth values, try adjusting **Frame Separation** or using an **Ignore Mask.**
Depth Generation			
Depth Detail	vectorDetail	0.5	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

Control (UI)	Knob (Scripting)	Default Value	Function
			values pick up finer details, but also increase processing time.
Normal Detail	normalDetail	0.25	Adjusts the resolution of the surface normals. Reduce the detail to smooth out the normals pass. The default value of 0.25 causes the normals pass to be calculated at a quarter resolution.
Noise	noiseLevel	0.01	Sets the amount of noise to ignore in the input footage when calculating the depth map. Try increasing this to smooth depth in flat image regions.
Strength	strength	1	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. In most cases, you can leave this at the default value.
Sharpness	sharpness	0.5	Defines how distinct object boundaries should be. Increase sharpness to separate objects and reduce it to smooth depth.
Smoothness	smoothness	0.5	Adjusts the smoothness weighting of the disparity calculation. Rather than affecting the depth calculation, this applies an intelligent blur on the result. 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.
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.

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

Control (UI)	Knob (Scripting)	Default Value	Function
			purpose.
Depth	depth	depth.Z	Sets the channel from the **image** input from which you want to take the depth data. **Note:** 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.
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 **invert depth** 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.

To learn more about the workflow, see Light Your Scene.

Note: The USD native equivalent light node in the New 3D System is the GeoDistantLight.

Note: DirectLight's classic 3D system equivalent is the Direct node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	look at	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.
	scene	An input to connect the light to the rest of your scene such as a GeoScene node.

Control (UI)	Knob (Scripting)	Default Value	Function
DirectLight Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
	range_link		passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location.
Basic			
Intensity	intensity	50000	Scales the power of the light linearly.
Exposure	exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	color	1	Sets the color of the emitted light.
Enable Color Temperature	enable_color_ temperature	off	Enables using color temperature.
Color Temperature	color_ temperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Spread Angle	angle	0.53	Angular diameter of the light in degrees. As an example, the sun is approximately 0.53 degrees as seen from Earth. Higher values broaden the light. This value

Control (UI)	Knob (Scripting)	Default Value	Function
			is assumed to be in the range 0<= angle < 360, and will be clipped to this range. Note that this implies that we can have the light emitting from more than a hemispherical area of light if angle > 180. While this is valid, it is possible that for large angles an EnvironmentLight may provide better performance. If angle is 0, the light represents a perfectly parallel light source.
Refine			
Diffuse Amount	diffuse	1	A multiplier for the effect this light has on the diffuse response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
Specular Amount	specular	1	A multiplier for the effect this light has on the specular response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
ScanlineRender Options			
Illumination Mask	object_ illumination_ mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_ receive_ shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Shadow Channels	shadow_ channels	none	Output the shadow contribution to this channel. Lighting and shadowing must be enabled on ScanlineRender for these channels to be active.
Position Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range

Control (UI)	Knob (Scripting)	Default Value	Function
			onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location.
Constrain			
Apply Constrain to Local Parent TRS	local_parent_constrain_enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target .

Control (UI)	Knob (Scripting)	Default Value	Function
			Scale - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Parent Translate	local_parent_ translate	0, 0, 0	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. When loading xform prim data from a scene file, the

Control (UI)	Knob (Scripting)	Default Value	Function
			prim's parent transform can be placed here.
Parent Rotate	local_parent_ rotate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Scale	local_parent_ scale	1, 1, 1	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_ xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_ combine_ enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs. When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation parameters

Control (UI)	Knob (Scripting)	Default Value	Function
			that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.
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 **Ctrl**/**Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			transformations applied then occur relative to the new pivot point location and rotation.
Pivot Rotate	pivot_rotate	0, 0, 0	You can hold down **Ctrl**/**Cmd** 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. Check **Specify Matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/ Export Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
	frame_link		passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location to load the prim.
Import From File	file_source_ enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's attribute data will be 'live' pulled into the node's parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_ enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them. The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Objects/Axis1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Axis1**.

Control (UI)	Knob (Scripting)	Default Value	Function
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_	off	When checked, the locator will be drawn in a fixed size

Control (UI)	Knob (Scripting)	Default Value	Function
	size		regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

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.

To learn more about the workflow, see Light Your Scene.

Note: The USD native equivalent light node in the New 3D System is the GeoDomeLight.

Tip: EnvironmentLight's classic 3D system equivalent is the Environment node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	map	An optional input to load in an image map to show up in the reflections of a mesh.

Control (UI)	Knob (Scripting)	Default Value	Function
EnvironmentLight Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location.
Basic			
Intensity	intensity	50000	Scales the power of the light linearly.
Exposure	exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.

Control (UI)	Knob (Scripting)	Default Value	Function
Color	color	1	Sets the color of the emitted light.
Enable Color Temperature	enable_color_temperature	off	Enables using color temperature.
Color Temperature	color_temperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Guide Radius	guide_radius	100000	The radius of guide geometry to use to visualize the environment light.
Refine			
Diffuse Amount	diffuse	1	A multiplier for the effect this light has on the diffuse response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
Specular Amount	specular	1	A multiplier for the effect this light has on the specular response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
ScanlineRender Options			
Illumination Mask	object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Blur Size	blur_size	1	Increase the size of the texture sampling region for each texture sample, causing it to blur. (ScanlineRender only option)
Mirror Image X	mirror_image_x	off	Flips the image in X. (ScanlineRender only option)
Mirror Image Y	mirror_image_y	off	Flips the image in Y. (ScanlineRender only option)
Position Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location.
Constrain			

Control (UI)	Knob (Scripting)	Default Value	Function
Apply Constrain to Local Parent TRS	local_parent_ constrain_ enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.

Control (UI)	Knob (Scripting)	Default Value	Function
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Parent Translate	local_parent_ translate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Rotate	local_parent_ rotate	0, 0, 0	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.

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.
Parent Scale	local_parent_scale	1, 1, 1	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_combine_enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs. When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex

Control (UI)	Knob (Scripting)	Default Value	Function
			selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** 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. Check **Specify Matrix** and copy or drag-and-drop matrix values from another object to apply those

Control (UI)	Knob (Scripting)	Default Value	Function
			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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/Export Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location to load the prim.
Import From File	file_source_enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's

Control (UI)	Knob (Scripting)	Default Value	Function
			attribute data will be 'live' pulled into the node's parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_ enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them. The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Objects/Axis1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Axis1**.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

FillShader

The FillShader node replaces selected material channels with a constant color.

To learn more about the workflow, see FillShader: Cut Out.

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. You can use the checkboxes on the right to select individual channels.
Color	color	1	Adjusts the color used as the constant to replace the material.

GeoActivation

The GeoActivation node allows you to activate or deactivate a prim.

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
GeoActivation			
Mask	mask_ patterns	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Invert Selection	invert_mask	off	When **on**, the **Mask** path selection is inverted so that the specified objects are isolated from the incoming layer. When **off**, the specified objects are not isolated.

Control (UI)	Knob (Scripting)	Default Value	Function
Method	method	deactivate	Sets how the objects behave. • **deactivate** - 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. • **activate** - the objects are reactivated if they were previously deactivated.

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.

To learn more about the workflow, see Using GeoBindMaterial to Assign Materials.

Note: 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 **Material** control.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoBindMaterial Tab			
Mask	mask_patterns	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/ All Meshes** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - selects the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.

Control (UI)	Knob (Scripting)	Default Value	Function
Advanced USD Settings			
Binding Strength	bindingStrength	Stronger than descendants	Your Material input will be applied to your scene graph hierarchy based on the **Mask** path that you set in your GeoBindMaterial > Mask input. The Binding Strength specifies under which conditions the Material is applied. • **Stronger than descendants** - applies the Material to all USD prims under your scene graph mask path. • **Weaker than descendants** - applies the Material to the USD prims under your mask path that do not already have a material. • **Passthrough** - preserves any existing binding strength on the prims. If no binding strength exists, applies the USD default of 'Weaker than descendants'. The USD hierarchy is displayed in your **Scene Graph**.
Material	material_path	Default - Injected/ All Meshes	Assigns a material or shader from the Scene Graph if nothing is connected to the **mat** input. Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/ All Meshes** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **Custom** - sets a custom selection of prims that exist in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to bind materials.
Purpose	purpose	All Purpose	The Purpose determines which rendering context the material binding applies to. • **Full** - Used for final rendering. Note that materials with this binding will not be present in the viewer. • **Preview** - Used for preview rendering. • **All Purpose** - Used if no other full or preview material bindings are present.

GeoCamera

GeoCamera allows you to create USD cameras. The GeoCamera node is the same as the GeoEditCamera node except that the **Mode** defaults to **Create**, instead of **Edit**. Both nodes allow you to use either **Mode**.

To learn more about the workflow, see Working with Cameras in the New 3D System.

Inputs and Controls

Control (UI)	Knob (Scripting)	Default Value	Function
GeoCamera Tab			
Mode	mode	Create	Select whether to **Create** or **Edit** a camera prim.
Path (available in **Create**	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\".

Control (UI)	Knob (Scripting)	Default Value	Function
Mode)			The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/ All Cameras	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Cameras** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All Cameras** - selects all Cameras in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is

Control (UI)	Knob (Scripting)	Default Value	Function
			pushed to the geo nodes below it that have the default mask set.
Sync Knobs With Input	sync_knobs_with_input	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Projection	projection	none	Sets the camera projection type when projecting 2D textures: • **Perspective** - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture. • **Orthographic** - objects are viewed using parallel projection. • **Spherical** - the entire 360° world is rendered as a spherical map. • **Cylindrical** - the entire 360° world is rendered as a cylindrical map.
Lens			
Focal Length	focalLength	50	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 Sensor Horizontal Size value, this determines the field of view angle. Shorter focal lengths increase the field of view angle, capturing more of a given scene.
Focus Distance	focusDistance	0	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	0	As in real world camera, fstop controls the amount of light that can reach the film negative. Only applies to depth of field rendering.

Control (UI)	Knob (Scripting)	Default Value	Function
a (r^3)	nuke_lensDistortA	0	Lens distortion A.
b (r^3)	nuke_lensDistortB	0	Lens distortion B.
c (r^3)	nuke_lensDistortC	0	Lens distortion C.
Camera Body > Shutter			
Open	shutter_open	0	Specifies the time (in frames) at which the camera shutter opens, relative to the current frame, for motion blurring. For example, a value of 0 opens the shutter at the start of the frame.
Close	shutter_close	0	Specifies the time (in frames) at which the camera shutter closes, relative to the current frame, for motion blurring. The difference between Shutter Open and Close determines how long the shutter is open. For example, values of 0 and 0.5 mean the shutter is open for half a frame.
Camera Body > Sensor			
Horizontal Size	horizontalAperture	20.95499992	Represents the physical width (in mm) of the camera sensor.
Vertical Size	verticalAperture	15.29080009	Represents the physical height (in mm) of the camera sensor.
Horizontal Offset	horizontalApertureOffset	0	Offsets the sensor horizontally (in mm), shifting the image left or right.
Vertical Offset	verticalApertureOffset	0	Offsets the sensor vertically (in mm), shifting the image up or down.
Scale	nuke_windowScale	x = 1, y = 1	Scale the film negative
Roll	nuke_windowRoll	0	Rotate the film negative without changing the camera axis rotation itself. The value is in degrees.

Control (UI)	Knob (Scripting)	Default Value	Function
Exposure	exposure	0	Applies a linear brightness multiplier at the sensor level, simulating digital exposure adjustment. Higher values result in a brighter image.
Camera Body > Mount			
Stereo Role	stereoRole	none	Specifies how this camera behaves in a stereo (left/right eye) setup. Choose between **mono**, **left**, or **right** to control which eye the camera represents.
Rendering			
Clipping Range	clippingRange	x = 1, y = 1000000	Sets the closest distance/farthest distance (in scene units) at which geometry is visible to the camera. Objects closer/further than this value will be invisible to the camera.
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a

Control (UI)	Knob (Scripting)	Default Value	Function
			vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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	rot_order	ZXY	Sets the order of rotation. The possible axial

Control (UI)	Knob (Scripting)	Default Value	Function
Order			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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			and pivot values above.
Matrix	matrix	N/A	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
Display Tab			
Selectable	selectable	on	When on, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.

GeoCard

The GeoCard node creates a card object in the scene with a prim path variable **{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.

You can 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.

Tip: GeoCard's classic 3D system equivalent is the Card node.

To learn more about the workflow, see Creating Prims in Your Scene.

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	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoCard1 or GeoCard5.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Primitive Attributes			
Kind	kind	subcomponent	Sets the **Kind** associated with this object. Nuke only uses **Kinds** with the GeoDrawMode node, which allows you to display complicated geometry in a

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene. • **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default. • **render** - the object is the full resolution version for use when rendering the scene. • **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference. **Note:** The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.
Visibility	visibility	inherited	Controls whether the object and its descendants are

Control (UI)	Knob (Scripting)	Default Value	Function
			visible in the scene: • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.
Mesh Topology			
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 **Project Settings** > **full size format** aspect ratio is used. 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 **lens-in focal** distance and **lens-in haperture** 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 **z** 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 **z** it fills this field of view.

Control (UI)	Knob (Scripting)	Default Value	Function
Mesh Attributes			
Subdivision	subdivision_scheme	none	Sets how meshes are rendered in the viewer based on different subdivision models: • **catmullClark**: algorithm that smooths the appearance of a mesh using recursive refinement to generate quadrilaterals • **Loop**: algorithm that is defined recursively, dividing a triangle into four smaller ones • **Bilinear**: algorithm that subdivides a mesh without smoothing the appearance • **None**: no subdivision is applied to the mesh **Note:** 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.
Boundary	interpolate_boundary	none	Controls where interpolation is applied at boundaries between faces: • **none** • **edge only** • **edge and corner**
Double Sided	double_sided	off	When enabled, the selected color and opacity is applied to both sides of the object's faces.
Color/Opacity			
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.

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.
Transform			
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.
A (r^3)	lens_in_ distort_a	0	Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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.
B (r^2)	lens_in_	0	Defines a square term that affects the radial

Control (UI)	Knob (Scripting)	Default Value	Function
	distort_b		distortion of the texture applied to the card, and the edges of the card. 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. 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.
Deform Tab			
Type	type	none	Select the deform type from the dropdown menu: • **none** - the card is not deformed. • **bilinear** - the card is deformed using handles and the **bilinear** controls. • **bicubic** - the card is deformed using handles, tangents, and the **bicubic** controls.
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 **break tangents** 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. **Note:** This control has no effect when **type** is set to **bilinear**.

Control (UI)	Knob (Scripting)	Default Value	Function
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 **Type** is set to **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 **new shape**.
	y_points	3	
New Shape	new_shape	N/A	Click to apply the current **x/y points** 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 **x points** -1.
Y Subdivide	y_subdivide	N/A	Subdivides the control points on the y axis creating new points equal to **y points** -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 **uv position**. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
CP	control_ points	N/A	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 **xyz** coordinates. • The left and right arrows change the column index of the control point. • The up and down arrows change the row index of the control point.
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 **new shape**.
	y_points	3	
New Shape	new_shape	N/A	Click to apply the current **x/y points** 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 **x points** -1.
Y Subdivide	y_subdivide	N/A	Subdivides the control points on the y axis creating new points equal to **y points** -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 **uv position**. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
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	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 **xyz** coordinates. • The left and right arrows change the column index of the control point. • The up and down arrows change the row index of the control point.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

GeoClearMask

The GeoClearMask node allows you to remove any masks that have been set upstream.

To learn more about the workflow, see Using Masks Downstream.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	The previous stage in the scene you wish to clear the mask from.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoClearMask Tab			
There are no controls except for the default Node settings.			

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.

To learn more about the workflow, see Using Collections.

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	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/ All Roots** - selects the default prim(s) for

Control (UI)	Knob (Scripting)	Default Value	Function
			the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - selects the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
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, **//PointLight*** adds all PointLights to the collection.
Excludes	excludes	none	Specifies prims to explicitly exclude from the collection. For example, **/PointLight1** 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 GeoVisibility to remove instances of the cube starting with **/GeoCube1_3*** from the scene.

Pruning Cube Duplicates by Collection

```
set cut_paste_input [stack 0]
                    version 17.0 v1.398328b
                    push $cut_paste_input
                    GeoCube {
                    setAuthorMode {double_sided set}
                    setAuthorMode {display_color set}
                    display_color {1 0.749311 0.020768}
                    display_color_panelDropped true
                    name GeoCube2
                    selected true
                    xpos -396
                    ypos 759
                    }
                    GeoInstance {
                    count 4
                    translate {1.889999986 0 0}
                    name GeoInstance1
                    selected true
                    xpos -396
                    ypos 818
                    }
                    GeoInstance {
                    translate {0 0 1.889999986}
                    name GeoInstance2
                    selected true
                    xpos -396
                    ypos 842
                    }
                    GeoScope {
                    prim_path /collections
                    name GeoScope1
                    selected true
                    xpos -396
                    ypos 899
                    }
                    GeoCollection {
                    mask_patterns /collections
                    collection_name cubes
                    includes /GeoCube2_3*
                    name GeoCollection2
                    selected true
                    xpos -396
                    ypos 947
                    }
                    GeoIsolate {
                    mask_patterns " %/collections:cubes"
                    name GeoActivation1
                    selected true
                    xpos -396
                    ypos 990
                    }
}
```

GeoConstrain

The GeoConstrain node allows you to constrain geometry, cameras, lights, and more, to other prims in your scene.

- Set a **Mask** to define the prim you want to constrain, and a **Target Path** to define a different prim you want to constrain to.

- Set a **Point**, choosing whether you want to target a specific face or vertex, or just constrain to the origin of the target prim.

- Choose the Constraint **Type** from: **Look At**, **Parent**, **Transformation**, **Translation**, **Rotation**, or **Scale**. See details about these below.

Learn more about the workflow at Constraining Prims.

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
GeoConstrain			
Mask	mask_ patterns	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim

Control (UI)	Knob (Scripting)	Default Value	Function
			(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Target Path	target_path	N/A	Define the path of a different prim you want to constrain to.
Point	target	Origin	Choose what to target. **Origin** - the origin of the target object. **Vertex** - a fixed vertex number on the target mesh. **Face** - a fixed face number on the target mesh. **Selection** - a vertex or face selection on the target.
Time	time_mode	Relative	Allows specification of how much time offset is desired for the the target point or the time to use for the target point. **Relative** - allows targeting the past or future of the target point by specifying a time offset from the current

Control (UI)	Knob (Scripting)	Default Value	Function
			time. **Absolute** - allows targeting the target point at a particular time by specifying a given time to use
Time	time_offset	0	A time offset for the constraint, allowing targeting the past or future of the target point
Constraint			
Type	constraint	LookAt	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	+Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.

Control (UI)	Knob (Scripting)	Default Value	Function
Rotate X	constraint_ rotate_x	on	Determines whether the constraint occurs around the X axis.
Rotate Y	constraint_ rotate_y	on	Determines whether the constraint occurs around the Y axis.
Rotate Z	constraint_ rotate_z	on	Determines whether the constraint occurs around the Z axis.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_ maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Extra Transform			
Coordinate System	coordinate_ system	Point	Coordinate system to use: **Point** - coordinate system at the target point.

Control (UI)	Knob (Scripting)	Default Value	Function
			Prim - coordinate system of the target prim. **World** - world coordinate system.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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.
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. Check **specify matrix** 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.

GeoCube

The GeoCube node creates a cube object in the scene with a prim path variable **{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.

You can translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node.

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.

Tip: GeoCube's classic 3D system equivalent is the Cube node.

To learn more about the workflow, see Creating Prims in Your Scene.

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	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoCube1 or GeoCube5.
Create Missing Parents	create_ missing_	on	When turned on, this will create the missing ancestor

Control (UI)	Knob (Scripting)	Default Value	Function
	parents		prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Primitive Attributes			
Kind	kind	group	Sets the **Kind** associated with this object. 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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene. • **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default. • **render** - the object is the full resolution version for use when rendering the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference. **Note:** The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.
Visibility	visibility	inherited	Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance. • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.
Mesh Topology			
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	Specifies the dimensions of the cube (from a positive z axis viewpoint): • **x** - controls the left face on the x axis. • **y** - controls the bottom face on the y axis. • **n** - controls the back face on the z axis. • **r** - controls the right face on the x axis. • **t** - controls the top face on the y axis.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **f** - controls the front face on the z axis.
Mesh Type	mesh_type	separate vertices	Determines how vertices and faces are affected by the **Subdivision** control: • **separate vertices** - edge vertices are separated so that they are not affected by **Subdivision**. • **shared vertices** - vertices are shared between the faces and end caps so that when **Subdivision** is enabled, the chosen smoothing method is applied. **Note:** 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. • **separate faces** - separate face meshes are added to the scene graph for the body and end caps. Enabling **Subdivision** has no effect.
Normals	normals	none	Sets the type of normals generated: • **none** - no normals are generated on the base prim, but may be generated by subdivision. • **face-vertex** - normals are generated for face vertices. **Tip:** Normals are not displayed in the Viewer by default. If you want to display normals in the Viewer, press **S** over the Viewer, go to the **3D** tab in the Viewer **Properties** panel, and enable the **show** > normals options by clicking the required buttons. See the Viewer node for more information.

Control (UI)	Knob (Scripting)	Default Value	Function
Mesh Attributes			
Subdivision	subdivision_scheme	none	Sets how meshes are rendered in the viewer based on different subdivision models: • **catmullClark**: algorithm that smooths the appearance of a mesh using recursive refinement to generate quadrilaterals • **Loop**: algorithm that is defined recursively, dividing a triangle into four smaller ones • **Bilinear**: algorithm that subdivides a mesh without smoothing the appearance • **None**: no subdivision is applied to the mesh **Note:** 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.
Boundary	interpolate_boundary	none	Controls where interpolation is applied at boundaries between faces: • **none** • **edge only** • **edge and corner**
Double Sided	double_sided	off	When enabled, the selected color and opacity is applied to both sides of the object's faces.
Color/Opacity			
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.

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.
Transform			
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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. You can hold down **Ctrl**/**Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

GeoCylinder

The GeoCylinder node creates a sphere object in the scene with a prim path variable **{nodename}** which is equal to the node name, such as /GeoCylinder1 or /GeoCylinder5. You can change the prim path to update the scene graph as required.

You can translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node.

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.

Note: GeoSphere and GeoCylinder have replaced the GeoRevolve node.

To learn more about the workflow, see Creating Prims in Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	mat	The file containing the material you want to apply to the object.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoCylinder Tab			
Path	prim_path	{nodename}	The root path of the new object. Path defaults to {nodename}.
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Primitive Attributes			
Kind	kind	group	Sets the **Kind** associated with this object. Nuke only uses **Kinds** with the GeoDrawMode node, which allows

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene. • **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default. • **render** - the object is the full resolution version for use when rendering the scene. • **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference. **Note:** The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.

Control (UI)	Knob (Scripting)	Default Value	Function
Visibility	visibility	inherited	Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance. • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.
Mesh Topology			
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 of the cylinder.
Height	height	2	Sets the height of the cylinder.
Scales	scales	1, 1, 1	A scaling factor for each axis.
U Extent	u_extent	360	Sets the extent to which the input image wraps around the object horizontally without extrapolating from the image edges. 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.
Sweep Angle	theta_extent	360	Sets the angle of sweep around the X axis.
Sweep Center	theta_center	180	Sets the center angle of the sweep around the X axis.
XZ Angle	y_extent	180	Sets the sweep angle from the XZ plane.
XY Center	y_center	90	Sets the center angle from the XZ plane.

Control (UI)	Knob (Scripting)	Default Value	Function
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.
Mesh Type	mesh_type	separate vertices	Determines how vertices and faces are affected by the **Subdivision** control: • **separate vertices** - edge vertices are separated so that they are not affected by **Subdivision**. • **shared vertices** - vertices are shared between the faces and end caps so that when **Subdivision** is enabled, the chosen smoothing method is applied. **Note:** 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. • **separate faces** - separate face meshes are added to the scene graph for the body and end caps. Enabling **Subdivision** has no effect.
Normals	normals	face-vertex	Sets the type of normals generated: • **none** - no normals are generated on the base prim, but may be generated by subdivision. • **face-vertex** - normals are generated for face vertices. **Tip:** Normals are not displayed in the Viewer by default. If you want to display normals in the Viewer, press **S** over the Viewer, go to the **3D** tab in the Viewer **Properties** panel, and enable the **show** > normals options by clicking the required buttons. See the Viewer node for more information.

Control (UI)	Knob (Scripting)	Default Value	Function
Mesh Attributes			
Subdivision	subdivision_scheme	none	Sets the subdivision method to apply when **Mesh Type** is set to **shared vertices.** • **catmullClark**: algorithm that smooths the appearance of a mesh using recursive refinement to generate quadrilaterals • **loop**: algorithm that is defined recursively, dividing a triangle into four smaller ones • **bilinear**: algorithm that subdivides a mesh without smoothing the appearance • **none**: no subdivision is applied to the mesh **Note:** 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.
Boundary	interpolate_boundary	none	Controls where interpolation is applied at boundaries between faces: • **none** • **edge only** • **edge and corner**
Double Sided	double_sided	off	When enabled, the selected color and opacity is applied to both sides of the object's faces.
Color/Opacity			
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.

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.
Transform			
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

GeoDiskLight

The GeoDiskLight creates or edits a native USD disk light prim. It is used to create a point in 3D space that emits a cone-shaped light.

See more about the workflow at Light Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input to connect the light to your node graph.
	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
GeoDiskLight Tab			
Mode	mode	Create	Choose whether to **Create** or **Edit** the light prim.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\". The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim

Control (UI)	Knob (Scripting)	Default Value	Function
			to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Lights	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Lights** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is

Control (UI)	Knob (Scripting)	Default Value	Function
			pushed to the geo nodes below it that have the default mask set.
Set From Prim	set_knobs_from_prim	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.

Control (UI)	Knob (Scripting)	Default Value	Function
Radius	inputs_radius	0.5	The radius defines the size of the light's source disk.
Cone Angle	inputs_shaping_cone_angle	90	Angular diameter of the light in degrees. The light will be cone shaped at smaller angles and behave more like a spot light.
Cone Softness	inputs_shaping_cone_softness	0	The softness of the cone angle; typically a value of 1 is used for a soft gradation, while 0 would give the cone angle a hard cut-off. Values greater than 1 can be used to further soften the gradation. The effect of this option is visible from ScanlineRender and not the 3D viewer.
Treat As Spotlight	nuke_disklight_treat_As_Spotlight	off	When enabled the light is treated as a spot light by renderers that support this option.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
Emission Focus	inputs_shaping_focus	0	Controls the spread of the light. Higher focus values pull light towards the center and narrow the spread.
Emission Focus Tint	inputs_shaping_focusTint	0	Controls the tint of the emission in the falloff region.
ScanlineRender Options			
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object.

Control (UI)	Knob (Scripting)	Default Value	Function
			Quadratic and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination Mask	object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_receive_shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims

Control (UI)	Knob (Scripting)	Default Value	Function
			that exist in your scene graph
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
Local Matrix			
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

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.

To learn more about the workflow, see Using GeoDisplace.

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	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/ All Meshes** - selects the default prim (s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the

Control (UI)	Knob (Scripting)	Default Value	Function
			default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Channels	channels	rgb	The **displace** input's channels to use for the displacement value. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Source	source	luminance	The source channel you want GeoDisplace to get a displacement map from. For example, if you selected **rgb** or **rgba** from the **channels** dropdown menu, you can use the red, green, or blue channel, or the pixel luminance as the source. • **luminance**, **red**, **green**, **blue**, **alpha** - offset each vertex along its normal by the selected channel value supplied

Control (UI)	Knob (Scripting)	Default Value	Function
			by the **displace** input. • **rgb absolute** - set each vertex's position to the XYZ position in the selected channel supplied by the **displace** input. • **rgb relative** - offset each vertex's current position by the XYZ position in the selected channel supplied by the **displace** input.
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 **weight** 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 **offset** fields. For example, if you enter 0.5 in the **offset y** field, 0.5 is added to the y value.
Filter Size	filter_size	5	Change the size of the filter used to sample the **displace** input texture.
Filter	filter	Parzen	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions

Control (UI)	Knob (Scripting)	Default Value	Function
			of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
UV Attribute Name	uv_attrib_ name	uv	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. • **Cf** - surface color • **N** - normal • **PW** - world-space point • **uv** - texture coordinates • **vel** - point velocity.
Recalculate Normals	recalc_ normals	on	When enabled, recalculate the normals after the displacement. Normals are usually incorrect after vertices have been moved. When disabled, use the normal values after displacement without recalculating.

GeoDistantLight

The GeoDistantLight creates or edits a native USD distant light prim. It is used as a directional light which can be transformed to shine in the direction of your choice.

See more about the workflow at Light Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input to connect the light to your node graph.
	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
GeoDistantLight Tab			
Mode	mode	Create	Choose whether to **Create** or **Edit** the light prim.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\". The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node

Control (UI)	Knob (Scripting)	Default Value	Function
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Lights	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Lights** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Custom - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below it that have the default mask set.
Set From Prim	set_knobs_from_prim	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The

Control (UI)	Knob (Scripting)	Default Value	Function
			default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Spread Angle	inputs_angle	0.53	Angular diameter of the light in degrees.As an example, the sun is approximately 0.53 degrees as seen from Earth. Higher values broaden the light. This value is assumed to be in the range 0<= angle < 360, and will be clipped to this range. Note that this implies that we can have the light emitting from more than a hemispherical area of light if angle > 180. While this is valid, it is possible that for large angles an EnvironmentLight may provide better performance. If angle is 0, the light represents a perfectly parallel light source.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
ScanlineRender Options			
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination	object_illumination_mask	Custom	The matched objects here will be illuminated

Control (UI)	Knob (Scripting)	Default Value	Function
Mask			by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_receive_shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and

Control (UI)	Knob (Scripting)	Default Value	Function
Data			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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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.

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 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
Local Matrix			
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid

Control (UI)	Knob (Scripting)	Default Value	Function
			color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

GeoDomeLight

The GeoDomeLight creates or edits a native USD dome light prim. It is used to produce a specular color on a mesh, so essentially anything plugged into the light will show up in the reflections of a mesh.

See more about the workflow at Light Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input to connect the light to your node graph.
	map	An optional input to load in an image map to show up in the reflections of a mesh.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoDomeLight Tab			
Mode	mode	Create	Choose whether to **Create** or **Edit** the light prim.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\". The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (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
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Lights	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Lights** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below it that have the default mask set.
Set From Prim	set_knobs_from_prim	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Basic			

Control (UI)	Knob (Scripting)	Default Value	Function
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Radius	guideRadius	100000	The radius of guide geometry to use to visualize the environment light.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.

Control (UI)	Knob (Scripting)	Default Value	Function
ScanlineRender Options			
Illumination Mask	object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Blur Size	slr_blur_size	x= 0, y = 0	Increase the size of the texture sampling region for each texture sample, causing it to blur. (ScanlineRender only option)
Mirror Image X	slr_mirror_image_x	0	Flips the image in X. (ScanlineRender only option)
Mirror Image Y	slr_mirror_image_y	0	Flips the image in Y. (ScanlineRender only option)
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			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. You can hold down **Ctrl**/**Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
Local Matrix			
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

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.

To learn more about the workflow, see Using GeoDrawMode.

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	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Apply Draw Mode	apply_draw_mode	on	When enabled, any prims with a **Kind** set are drawn using the selected **Draw Mode**. Any prims with no **Kind** set are drawn as normal. The selected prims are also assigned the **model:applyDrawMode** attribute when this control is enabled, which can be inherited by prims in subtrees. When disabled, all prims are drawn as normal.
Draw Color	draw_mode_color	1, 0, 0	Sets the draw color of the replacement proxy prims.
Draw Mode	draw_mode	Default	When **Apply Draw Mode** is enabled, the specified prims are affected by the mode selected: • **Origin** - the prims are replaced by a proxy origin indicator drawn in the selected **Draw Color**. • **Bounds** - the prims are replaced by a proxy bounding box indicator drawn in the selected **Draw Color**. • **Cards** - the prims are replaced by proxy cards drawn in the selected **Draw Color**. The appearance of the cards is determined by the **Card Geometry** and **Texture XYZ** controls. • **Default** - the prims are drawn as normal, regardless of what **Kind** attribute they have set. • **Inherited** - the prims inherit their **Draw Mode** from their parent prim.
Card Geometry	card_geometry	Cross	When **Draw Mode** is set to **Card**, determines how the proxy cards are drawn: • **Cross** - two proxy cards replace the specified prims along

Control (UI)	Knob (Scripting)	Default Value	Function
			the XYZ axes. • **Box** - six proxy cards replace the specified prims a box 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. **Note:** The **Texture** controls are only available when **Draw Mode** is set to **Card**.
	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.

To learn more about the workflow, see Using GeoDuplicate.

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	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Prim Path	prim_path	{path}_ {nodename}	The root path of the new object. **Prim Path** defaults to the variable **{path}_{nodename}**, which is equal to the path plus the node name, such as **GeoCard1_GeoDuplicate1** or **GeoCard5_GeoDuplicate2**.
Parent Type	parent_type	Xform	Sets the type of prim to create if there are missing ancestors in the path. **Note:** Setting the **Parent Type** to **None** may cause some referenced objects to behave as if they don't exist.
Mode	mode	Duplicate	Sets the duplication mode: • **Duplicate** - creates a standalone, flattened copy of the specified object. **Duplicate** 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. **Tip: Duplicate** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Reference** - creates an instance of the specified object. **Reference** is computationally cheaper, as it is not flattened, and changes made to the source object are reflected in the referenced duplicate.

GeoEditCamera

GeoEditCamera allows you to edit or create USD cameras.

To learn more about the workflow, see Working with Cameras in the New 3D System.

Note: The GeoEditCamera node has authoring knobs. Learn more about Authoring Modes.

Note: The GeoEditCamera node is the same as the GeoCamera node except that the **Mode** defaults to **Edit**, instead of **Create**. Both nodes allow you to use either **Mode**.

Inputs and Controls

Control (UI)	Knob (Scripting)	Default Value	Function
GeoEditCamera Tab			
Mode	mode	Edit	Select whether to **Create** or **Edit**a camera prim.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\".

Control (UI)	Knob (Scripting)	Default Value	Function
			The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/ All Cameras	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Cameras** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All Cameras** - selects all Cameras in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is

Control (UI)	Knob (Scripting)	Default Value	Function
			pushed to the geo nodes below it that have the default mask set.
Sync Knobs With Input	sync_knobs_with_input	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Projection	projection	none	Sets the camera projection type when projecting 2D textures: • **Perspective** - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture. • **Orthographic** - objects are viewed using parallel projection. • **Spherical** - the entire 360° world is rendered as a spherical map. • **Cylindrical** - the entire 360° world is rendered as a cylindrical map.
Lens			
Focal Length	focalLength	50	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 Sensor Horizontal Size value, this determines the field of view angle. Shorter focal lengths increase the field of view angle, capturing more of a given scene.
Focus Distance	focusDistance	0	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	0	As in real world camera, fstop controls the amount of light that can reach the film negative. Only applies to depth of field rendering.

Control (UI)	Knob (Scripting)	Default Value	Function
a (r^3)	nuke_lensDistortA	0	Lens distortion A.
b (r^3)	nuke_lensDistortB	0	Lens distortion B.
c (r^3)	nuke_lensDistortC	0	Lens distortion C.
Camera Body > Shutter			
Open	shutter_open	0	Specifies the time (in frames) at which the camera shutter opens, relative to the current frame, for motion blurring. For example, a value of 0 opens the shutter at the start of the frame.
Close	shutter_close	0	Specifies the time (in frames) at which the camera shutter closes, relative to the current frame, for motion blurring. The difference between Shutter Open and Close determines how long the shutter is open. For example, values of 0 and 0.5 mean the shutter is open for half a frame.
Camera Body > Sensor			
Horizontal Size	horizontalAperture	20.95499992	Represents the physical width (in mm) of the camera sensor.
Vertical Size	verticalAperture	15.29080009	Represents the physical height (in mm) of the camera sensor.
Horizontal Offset	horizontalApertureOffset	0	Offsets the sensor horizontally (in mm), shifting the image left or right.
Vertical Offset	verticalApertureOffset	0	Offsets the sensor vertically (in mm), shifting the image up or down.
Scale	nuke_windowScale	x = 1, y = 1	Scale the film negative
Roll	nuke_windowRoll	0	Rotate the film negative without changing the camera axis rotation itself. The value is in degrees.

Control (UI)	Knob (Scripting)	Default Value	Function
Exposure	exposure	0	Applies a linear brightness multiplier at the sensor level, simulating digital exposure adjustment. Higher values result in a brighter image.
Camera Body > Mount			
Stereo Role	stereoRole	none	Specifies how this camera behaves in a stereo (left/right eye) setup. Choose between **mono**, **left**, or **right** to control which eye the camera represents.
Rendering			
Clipping Range	clippingRange	x = 1, y = 1000000	Sets the closest distance/farthest distance (in scene units) at which geometry is visible to the camera. Objects closer/further than this value will be invisible to the camera.
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a

Control (UI)	Knob (Scripting)	Default Value	Function
			vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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	rot_order	ZXY	Sets the order of rotation. The possible axial

Control (UI)	Knob (Scripting)	Default Value	Function
Order			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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			and pivot values above.
Matrix	matrix	N/A	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
Display Tab			
Selectable	selectable	on	When on, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.

GeoEditLight

The GeoEditLight node edits a native USD light prim. Select a light type under **Schema**, and the properties will dynamically populate based on this.

See more about the workflow at Using USD Lights.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input to connect the light to your node graph.
	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
GeoEditLight Tab			
Schema	schema_name	DistantLight	Select the type of light you wish to edit from: **DistantLight**, **DiskLight**, **DomeLight**, and **SphereLight**. The properties below will then populate based on this.
Mode	mode	Edit	Specifies that you wish to **Edit** the light prim.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Lights	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Lights** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the

Control (UI)	Knob (Scripting)	Default Value	Function
			default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below it that have the default mask set.
Sync Knobs With Input	sync_knobs_with_input	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\". The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing	create_missing_parents	on	When turned on, this will create the missing

Control (UI)	Knob (Scripting)	Default Value	Function
Parents			ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Schema = DistantLight			
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light.

Control (UI)	Knob (Scripting)	Default Value	Function
			When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Spread Angle	inputs_angle	0.53	Angular diameter of the light in degrees.As an example, the sun is approximately 0.53 degrees as seen from Earth. Higher values broaden the light. This value is assumed to be in the range 0<= angle < 360, and will be clipped to this range. Note that this implies that we can have the light emitting from more than a hemispherical area of light if angle > 180. While this is valid, it is possible that for large angles an EnvironmentLight may provide better performance. If angle is 0, the light represents a perfectly parallel light source.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
ScanlineRender Options			
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)

Control (UI)	Knob (Scripting)	Default Value	Function
Illumination Mask	slr_object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	slr_castShadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	slr_object_receive_shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Schema = DiskLight			

Control (UI)	Knob (Scripting)	Default Value	Function
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Radius	inputs_radius	0.5	The radius defines the size of the light's source disk.
Cone Angle	inputs_shaping_cone_ angle	90	Angular diameter of the light in degrees. The light will be cone shaped at smaller angles and behave more like a spot light.

Control (UI)	Knob (Scripting)	Default Value	Function
Cone Softness	inputs_shaping_cone_softness	0	The softness of the cone angle; typically a value of 1 is used for a soft gradation, while 0 would give the cone angle a hard cut-off. Values greater than 1 can be used to further soften the gradation. The effect of this option is visible from ScanlineRender and not the 3D viewer.
Treat As Spotlight	nuke_disklight_treat_As_Spotlight	off	When enabled the light is treated as a spot light by renderers that support this option.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
Emission Focus	inputs_shaping_focus	0	Controls the spread of the light. Higher focus values pull light towards the center and narrow the spread.
Emission Focus Tint	inputs_shaping_focusTint	0	Controls the tint of the emission in the falloff region.
ScanlineRender Options			
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination Mask	slr_object_illumination_mask	Custom	The matched objects here will be illuminated by this light.

Control (UI)	Knob (Scripting)	Default Value	Function
			Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	slr_castShadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	slr_object_receive_ shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Schema = DomeLight			
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.

Control (UI)	Knob (Scripting)	Default Value	Function
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Radius	guideRadius	100000	The radius of guide geometry to use to visualize the environment light.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
ScanlineRender Options			

Control (UI)	Knob (Scripting)	Default Value	Function
Illumination Mask	slr_object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Blur Size	slr_blur_size	x= 0, y = 0	Increase the size of the texture sampling region for each texture sample, causing it to blur. (ScanlineRender only option)
Mirror Image X	slr_mirror_image_x	0	Flips the image in X. (ScanlineRender only option)
Mirror Image Y	slr_mirror_image_y	0	Flips the image in Y. (ScanlineRender only option)
Schema = SphereLight			
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it

Control (UI)	Knob (Scripting)	Default Value	Function
			easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Radius	inputs_radius	0.5	The radius to use for the point light when modelled as a sphere.
Treat As Point	treatAsPoint	off	When enabled the light is treated as a point light by renderers that support this option. For renderers that don't support this (or when this option is disabled) the radius will be used and the light modelled as a sphere.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
ScanlineRender Options			

Control (UI)	Knob (Scripting)	Default Value	Function
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination Mask	slr_object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	slr_castShadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	slr_object_receive_shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards. There can be multiple mask patterns separated by spaces.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Transform (All Schemas)			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
Local Matrix			
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after

Control (UI)	Knob (Scripting)	Default Value	Function
			(Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
Display Tab (All Schemas)			
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom

Control (UI)	Knob (Scripting)	Default Value	Function
			settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

GeoExport

The GeoExport node exports a flattened stage to a file. You can export USD files using **.usd**, **.usda**, **.usdc**, **.abc** 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.

To learn more about the workflow, see Export From Your Scene.

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			
Format	file_type	abc	Specifies the file type for export. Select from **.usd**, **.usda**, **.usdc**, **.abc** files.
File	file	none	Specifies the file path to where the stage is written including the required file format.
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.

GeoGeneratePoints

Using the GeoGeneratePoints 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: GeoGeneratePoints'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.
	Mask	An optional image to use as a mask. By default, the point cloud 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 **Mask** control is disabled or set to **None**.
	Source	The source footage from which the camera information was obtained.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoGeneratePoints Tab			
Path	prim_path	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoGeneratePoints1 or GeoGeneratePoints5.
Create Missing Parents	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Ignore Mask	ignore	None	Set the mask type to exclude areas of the sequence during generation:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the source clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the source clip to define which areas to ignore. • **Mask Luminance** - use the luminance of the **Mask** input to define which areas to ignore. • **Mask Inverted Luminance** - use the inverted luminance of the **Mask** input to define which areas to ignore. • **Mask Alpha** - use the **Mask** input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted **Mask** input alpha channel to define which areas to ignore.
Set Keyframes			
Analyze Sequence	analyzeSequence	N/A	Click to automatically analyze the sequence and set the required keyframes to use when generating the point cloud. **Note:** Keyframes are selected to provide a large enough camera baseline to triangulate points, but you can add and delete keyframes manually, if necessary.
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	frameSpacing	15	Sets the interval between keyframes when you click

Control (UI)	Knob (Scripting)	Default Value	Function
Spacing			**Add All**. 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 **Frame Spacing** 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	Displays the depth accuracy calculated at the current frame when using the automatic **Set Keyframes** method. The accuracy rating can help you to select frame ranges when generating a point cloud - higher accuracy frames produce cleaner point clouds.
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	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. Points can also be added to the point cloud in stages using different frame range selections. Use **Calculated Accuracy** to determine the most accurate frames for generation.
Clear Points	clearPoints	N/A	Click to clear all tracked points.
Post Filtering			

Control (UI)	Knob (Scripting)	Default Value	Function
Display rejected points	displayRejectedPoints	enabled	When enabled, points that fall outside the **Angle** and **Density Thresholds** are highlighted in the 3D Viewer. When disabled, all rejected points are removed from the Viewer.
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 retain the more accurate points. 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 **Angle** and **DensityThresholds**. **Tip:** To clean up the point cloud, try enabling **Output points per frame** and **Display rejected points**. You can then tune the **Post Filtering** 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	off	When enabled, only the points generated at the current frame are displayed in the Viewer. When disabled, points from all tracked frames are displayed.

Control (UI)	Knob (Scripting)	Default Value	Function
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 **Groups** tab are displayed in the 3D Viewer. You can label the point cloud using **Groups** to help 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. To delete points use **Vertex selection** mode in the 3D Viewer and press the **delete** key.
Groups	groups	none	Lists all groups in the point cloud and allows you to set the **name**, **color**, and **visibility** of each group. To create groups, enable **Vertex selection** 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. Mesh creation is based on the SGP 2006 paper, Poisson Surface Reconstruction by Michael Kazhdan, Matthew Bolitho, and Hugues Hoppe. The original

Control (UI)	Knob (Scripting)	Default Value	Function
			source code and paper can be found at http://www.cs.jhu.edu/~misha/Code/PoissonRecon/.
Samples	samplesPerNode	1	Specifies the minimum number of sample points used to calculate mesh points, using floating point values. 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.
Display Tab			
Selectable	selectable	on	When on, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.
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, Alembic, MaterialX, and Gaussian Splat files from external files into Nuke. It supports the import of **.usd**, **.usda**, **.usdc**, **.abc**, **.mltx** files.

GeoImport does not allow you to change the path of the object in the scene graph so be aware that conflicts can easily occur when importing the same file more than once - to avoid these entirely, use the GeoReference node to create an instance, or light-weight copy, of the required objects.

To learn more about the workflow, see Importing with GeoImport.

Note: 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 Tab			
File	file	none	The path to the external file that you want to import. When the file is first loaded in, this will launch the Import Scene Graph Dialog. It supports the import of **.usd**, **.usda**, **.usdc**, **.abc**, **.mltx** files.
Localization Policy	localizationPolicy	from auto-localize path	Allow local file caching. Copies of the files are stored in a specified local folder for faster access times. This is supported for Alembic (**.abc**) files only, and will be disabled if you import a USD file.

Control (UI)	Knob (Scripting)	Default Value	Function
			on: always localize **from auto-localize path**: localize if the file resides in the "auto-localize from" directory **on demand**: localize on demand **off**: never localize
Update	updateLocalization	Update	If you change the Localization Policy setting, click Update button to apply the change.
Metadata: Promote layer metadata to stage	promote_layer_ metadata	enabled	If true, the following metadata fields can be promoted to the stage: • Start time code • End time code • Frames per second • Time codes per second • Frame precision • Meters per unit • Default prim • Up axis • Owner • Custom layer metadata Note that if multiple layers specify a value, the strongest opinion is used.
Reload	reload	N/A	Click to update the scene graph with any changes made to the external USD file specified in the **File** control.
Frame Range	range_first range_last	1, 1	If range size is non-zero then animation is assumed to be contained in the input file data, forcing the graph to re- evaluate on frame changes. If the input file is known to be static then resetting these to 1 , 1 stop this graph updating.
Time Mapping			

Control (UI)	Knob (Scripting)	Default Value	Function
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.
Scene Graph Tab			
Scene Graph	N/A	N/A	Once a file is loaded in, use the Scene Graph tab where you can manage your stage after import. See more at Importing with GeoImport.

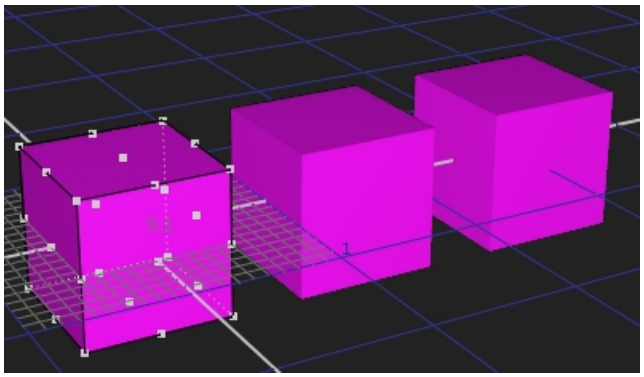
GeoInstance

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**:

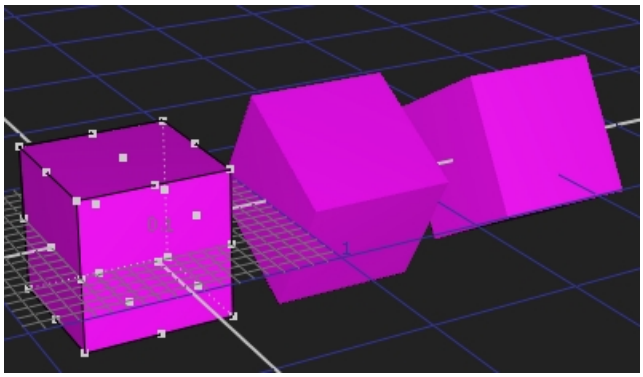
- **reference** - creates a number of reference instances from the source object. You can modify an individual instance using its unique path in the Scene Graph, giving you full control of each instance.
- **instanceable reference** - similar to the **reference** mode, but computationally cheaper. You 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.

To learn more about the workflow, see Instancing Geometry.

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	Default - Injected/ All roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			Last modified - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Instance Mode	instance_ mode	reference	Specifies the type of instances to create: • **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. This mode is useful for particles or other geometry with thousands of parts as you can only modify the whole instance at once.
Original	original_	deactivate	Determines what happens to the original objects specified in

Control (UI)	Knob (Scripting)	Default Value	Function
	mode		the **Mask** control: • **deactivate** - the source prims are deactivated, as if they were never in the scene. • **activate** - the source prims are activated, which can be useful to override inherited deactivation. • **hide** - the source prims are hidden in the scene, but can still be referenced as normal. • **show** - the source prims are shown in the scene, which can be useful to override an inherited hidden state. • **include** - the source prims are included in the instance **Count** replacing the first instance, so one fewer instances is created.
Count	count	2	Specifies the number of instances to create from the objects in the **Mask** 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	Sets the type of prim to create if there are missing ancestors in the path. **Note:** The default, **None**, may cause some referenced objects to behave as if they don't exist.
Naming	names	{name}_{index}	Specifies the naming convention for the instances in the Scene Graph. The default, **{name}_{index}**, creates instances named from the **Mask** control and the index number of the instance. For example, if GeoCube1 is instanced with a **Count** of **3**: • GeoCube1_1 • GeoCube1_2 • GeoCube1_3 You can also use the following tokens to create your own

Control (UI)	Knob (Scripting)	Default Value	Function
			naming convention: • **{name}** - the name of the original object. • **{index}** - the 1-based index of the new object. • **{count}** - the total count. • **{srcindex}** - the index in the list of the source objects. • **{srccount}** - the count of source objects.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and transform the instanced objects according to the transformation data in

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
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 instanced objects 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 instanced objects around the x, y, and z axes. You can adjust rotate values by holding down **Ctrl/Cmd** 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.

Control (UI)	Knob (Scripting)	Default Value	Function
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.

GeoMask

The GeoMask node allows you to specify prims to affect. GeoMask pulls from primary input pipe, and when connected to other nodes downstream, the Mask is pushed onwards to the node below it.

To learn more about the workflow, see Using Masks Downstream.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	The previous stage in the scene you wish to affect.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoMask Tab			
Mask	mask_ patterns	Custom	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style variables, such as **/***, to create masks or use individual prim names separated by spaces. For example, **/GeoCube1 /GeoCard3** applies the transform to only those prims. **Default - Injected/Empty** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - selects the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.

GeoMerge

The GeoMerge node combines prims from different node branches and lets you manage how layers are merged. GeoMerge allows you to merge all nodes with the prefix 'Geo'. (Nodes with the prefix 'Geo' create or edit USD data.)

GeoMerge and GeoScene differ now in that GeoScene is the only node that allows Camera, Axis, DirectLight, SpotLight, EnvironmentLight and PointLight nodes to connect to it to bring into a scene. These nodes cannot connect to GeoMerge.

There are some USD behaviors which can affect how you use this node for merging. To learn more about the workflow, see Merging 3D Data.

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	Sets how the merge is performed: • **Merge Layers** - the default behavior for merging, it combines the prims from one pipe with the prims of another pipe. It adds all layers from the inputs to the layer stack. See Merge Layers. • **Duplicate Prims** - Allows you to take a prim input and create a copy with a user-defined name.

Control (UI)	Knob (Scripting)	Default Value	Function
			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. See Duplicate Prims. • **Flatten Layers**- Flattens layers from each input and adds the flattened single layer to the layer stack. See Flatten Layers. • **Flatten to Single Layer** - Flattens the layers from each input into one single layer. See Flatten to Single Layer.
Duplicate Prims option settings			
Copy Name	path_pattern	{path}_Copy {index}	The path of the duplicated prim(s). If this is left empty, a suffix of **CopyN** is added. You can use the following terms in the path to substitute text: **${name}** - name of the prim **${path}** - full path of the prim **${count}** - total number of inputs **${nodename}** - name of this node
Duplicate in place	in_place	off	Choose whether to duplicate the whole hiearchy containing the prim or to attempt to only duplicate prims that were modified in the input branch.

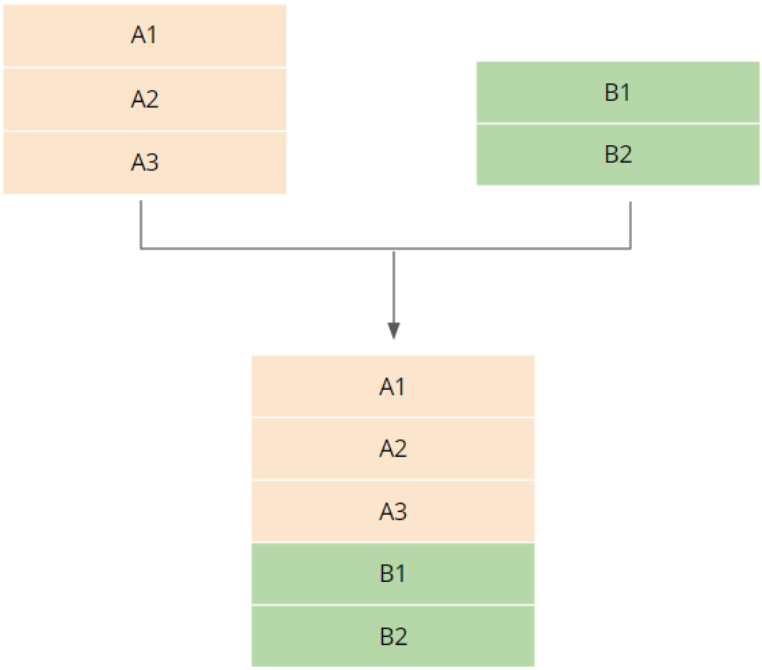
Merge Mode Options

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 GeoVisibility or GeoActivation) 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

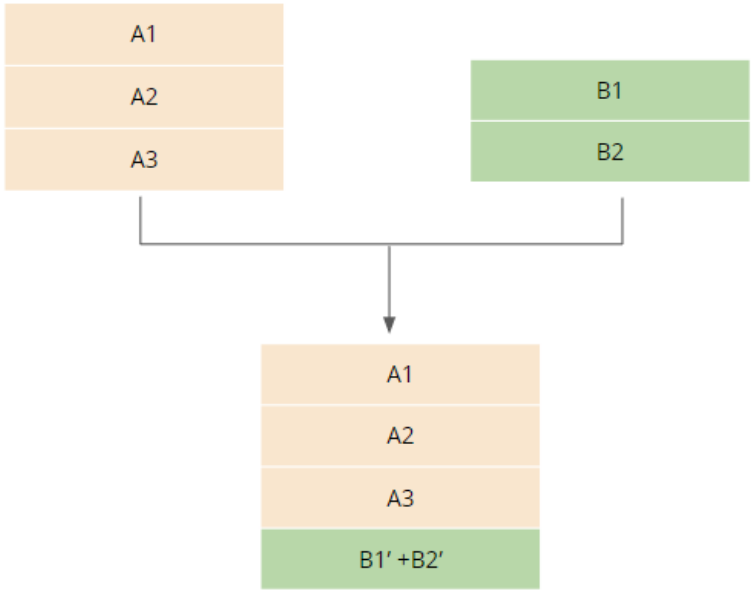
For scenario 2 (above), where you want to merge modified geometry that is an offshoot of the same stage you can use the GeoActivation node and select **Deisolate** on merge. The Deisolate knob removes any layers created by GeoActivation nodes allowing you to modify geometry and merge without the rest 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.

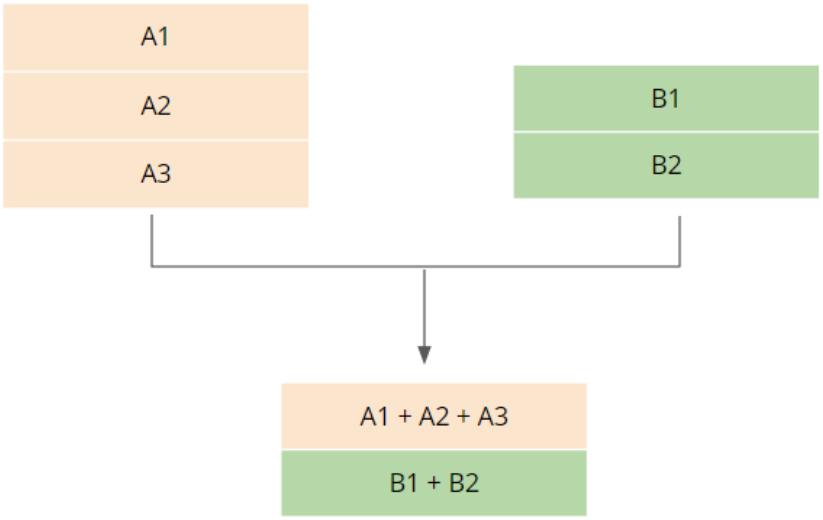
This flattens all the layers on input A and duplicates their root prims. Input B is merged unchanged - only prims that exist on both branches are duplicated.



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.

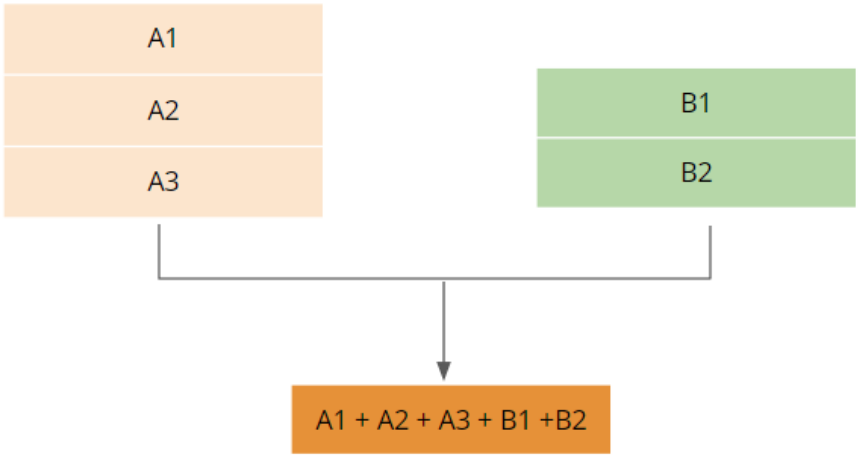


Flatten Layers: Incoming layers are flattened and merged to form the result.

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.

To learn more about the workflow, see Using GeoNoise.

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	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Meshes** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated.

Control (UI)	Knob (Scripting)	Default Value	Function
			All roots - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Noise Type	mode	fBm	Choose the type of noise to use: • **Turbulence** is the same as **fBm** except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1. • **fBm** (fractional Brownian motion) runs **noise()** octave times at different scales to get random numbers between -1 and +1 and then adds them up.
Amount xyz	amount	1, 1, 1	Allows you to control the amount of noise applied to the prim on each axis. **Tip:** If you want to affect all axes equally, click the single/multiple value button on the right of the **Properties** panel to gang the xyz controls into a single **Amount** slider.
Octaves	octaves	1	Controls the amount of detail in the noise applied to the prim.

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **Octaves**. 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. **Gain** 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 **time**=**0** at frame 1 and **time**=**1** at frame 10 produces a wave effect.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Pivot Point to** Snaps your pivot point by using a custom script.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** and dragging in the 3D Viewer.
Scale	scaling	1,1,1	Scales the noise on the x, y, and z axes.
Uniform Scale	uniform_ scale	1	Scales the noise simultaneously on the x, y, and z axes.
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 **Ctrl**/**Cmd**

Control (UI)	Knob (Scripting)	Default Value	Function
			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 **Ctrl**/**Cmd** 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	The matrix displays values from the noise's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.

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.

Use the option **Action** > **build** to rebuild each normal specified in **Attribute Name** based on the surrounding vertices.

The **Angle Threshold** determines the break angle where two faces no longer constitute a smooth surface.

Tip: GeoNormals's classic 3D system equivalent is the Normals node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	lookat	An optional input that points all normals at the object connected to this input and adds the **Normal** xyz values to that position. **Note:** **Action** must be set to **lookat** for this input to work as expected.
	unnamed	The previous stage in the scene you want to affect.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoNormals			
Mask	mask_ patterns	All Meshes	Specifies the mask pattern to match the prim names to affect. The default mask, All Meshes, defaults to select the top most level of meshes in your scene graph. You can use standard glob-style variables, such as **/***, to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Action	action	unchanged	Determines what happens to any normals in prims selected by the **Mask** control: • **unchanged** - any normals specified in the **Attribute Name** are unaffected. • **set** - assigns normals specified in the **Attribute Name** to a constant value set by the **Normal** control's xyz values. • **build** - rebuild each normal specified in the **Attribute Name** based on the surrounding vertices. The **Angle Threshold** determines the break angle where two faces no longer constitute a smooth surface. • **lookat** - points all normals specified in the **Attribute Name** at the object connected to the **lookat** input and adds the **Normal** xyz values to that position. • **delete** - removes the normals specified in the **Attribute Name** from all geometry groups.
Invert	invert	off	Inverts the added or rebuilt normals. **Note:** The **Invert** control affects all actions, even **unchanged**.
Normal	normal	0, 0, 0	When **Action** is equal to **set** or **lookat**, assigns a constant xyz value to the normals specified in the **Attribute Name**.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The **Normal** xyz values are added to the **lookat** position.
Angle Threshold	threshold	45	When **Action** is set to **build**, 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. **Note: Angle Threshold** only affects vertex normals.
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.

To learn more about the workflow, see Creating Points Clouds.

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 Tab			
Path	prim_path	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoPoint1 or GeoPoints5.
Create Missing Parents	parentPrimType	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Points	points_path	Default - Injected/Empty	You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/ Empty** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			Last modified - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to specify source prims.
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 Colors	color_channel	rgba	The point colors are taken from these channels in the first input.
Point Size	point_size	0.0001	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	Sets how the depth information is converted into the distance between the camera and objects: • **Z** - depth is the input depth. • **1/Z** - depth is 1 divided by input depth. Nuke and RenderMan use this depth calculation by default. • **-Z** - depth is -input depth. • **-1/Z** - depth is -1 divided by input depth. Maya

Control (UI)	Knob (Scripting)	Default Value	Function
			uses this depth calculation by default.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			software, such as 3D-Equalizer, Maya, or Boujou. • **Export chan file** - 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.
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 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 **Ctrl/Cmd** 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 **Ctrl/Cmd** 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 **Ctrl/Cmd** and dragging the axis in the 3D Viewer.

Control (UI)	Knob (Scripting)	Default Value	Function
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

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 Tab			
Path	prim_path	{nodename}	The root path of the new object. Path defaults to {nodename}.
Create Missing Parents	parent_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask	mask_ patterns	Default - Injected/ Empty	You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/ Empty** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: 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	Sets the maximum depth of the tree that is used for surface reconstruction. The **Depth** 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. You can also think of it as the density of the voxels used by the solver. Running at depth **d** corresponds to solving on a voxel grid whose resolution is no larger than 2^d x 2^d x 2^d. **Note:** The reconstructor adapts the octree to the sampling density, so the specified reconstruction depth is only an upper bound.
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
			Tip: We found that for reconstructions of **Depth** >= **9**, a **Solver Divide** of **7** or **8** can greatly reduce memory usage.
Iso Divide	iso_divide	8	Specifies the depth at which a block iso-surface extractor is used to extract the iso-surface. **Iso Divide** helps reduce the memory overhead at the cost of a small increase in extraction time. **Tip:** We found that for reconstructions of **Depth** >= **9**, an **Iso Divide** of **7** or **8** can greatly reduce memory usage.
Samples Per Node	samples_per_node	1	Specifies the minimum number of sample points that fall within an octree node as the octree construction is adapted to sampling density. 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.
Confidence	confidence	off	When enabled, the reconstructor uses the size of the normals as confidence information. When disabled, all normals are normalized to have a unit-length prior to reconstruction.
Display Tab			
Selectable	selectable	on	When on, you can make selections as normal in the Viewer. When disabled, points cannot be selected or changed.

GeoProjectUV

The GeoProjectUV 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.

To learn more about the workflow, see Projections in the New 3D System.

Note: GeoProjectUV'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
GeoProjectUV			
Mask	mask_ patterns	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Meshes** - selects the default prim (s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph.

Control (UI)	Knob (Scripting)	Default Value	Function
			All Lights - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in the current node is pushed to the geo nodes below it that have the default mask set.
Projection	projection	Perspective	Sets the projection type for rendered objects. Usually, it's best to select a type that's close to the object's surface shape. • Off • Perspective • Planar • Spherical • Cylindrical **Note:** When **Projection** is set to **off**, the GeoProjectUV node is essentially disabled.
Plane	plane	XY	Sets the projection direction to project the texture image along axes: • XY • YZ • ZX

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: This dropdown menu is only available if you selected **planar** as the projection type.
Project On	project_on	Both	Sets which surfaces of a 3D object the projection falls on through the camera: • Both • Front • Back
Cull Behind Projection Source	proj_plane_culling	off	Do not project uvs onto points and vertices behind projection plane. Turn this on if the renderer being used does not support the perspective (w) coordinate for uvs. By default this is off because removing uv(w) coordinates from vertices behind the projection source can break the uv interpolation across the polygon's surface when some vertices end up behind the plane while the rest are in front.
View Frustum Culling	frustum_culling	off	When enabled, the GeoProjectUV 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.
Generate	generate_w	off	When enabled, GeoProjectUV generates an **stw** attribute

Control (UI)	Knob (Scripting)	Default Value	Function
Perspective			that adds a perspective component **w** to the UV coordinates.
Attribute Name	uv_attrib_ name	primvars:st	When **Generate Perspective** is enabled, **Attribute Name** 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.
W Attribute Name	uvw_attrib_ name	primvars:stw	When **Generate Perspective** is enabled, **Attribute Name** 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	off	If on, the projection will be applied at the reference frame only.
Reference Frame	reference_ frame	0	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	N/A	Allows you to view animation keys and modify them.
Set to Current Frame	set_to_ current_ frame	N/A	Set the reference frame to the current frame.

GeoPython

The GeoPython node allows you to view and edit your stage's Python source code.

For example, you could use Python to make a 3D sphere of points.

To see an example of this, see Editing with GeoPython Node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	The stage you want to visualise.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoPython Tab			
[Python Panel]	python_ source	N/A	Allows you to view and edit your stage's Python source code.

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.

To learn more about the workflow, see Using GeoRadial 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	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Meshes** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node

Control (UI)	Knob (Scripting)	Default Value	Function
			directly below it if that node has the default path mask set.
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	Moves the rotation center point of the warp on the xyz axes. **Tip:** You can also move the center point by dragging the widget in the Viewer.
Scale xyz	scale	1, 1, 1	Sets the amount of distortion in the x, y, or z directions.
Preserve Center	preserve_ center	on	When enabled, keep the object centered in its original place in 3D space. When disabled, allow the object to be offset from the origin.

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 more about the workflow at Referencing with GeoReference.

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 Tab			
Path	prim_path	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoReference1 or GeoReference5.
Create Missing Parents	parent_ primType	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Reference Type	reference_ type	Reference	Sets the type of reference to load: • **Reference** - load the object immediately. • **Payload** - payloads can be delayed to stop heavy geometry loading until you're ready.
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.

Control (UI)	Knob (Scripting)	Default Value	Function
Reload	reload	N/A	Click to reload the target file or referenced prim location.
Time Mapping			
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.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

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 does not have any node-specific properties.

GeoScene differs from GeoMerge now in that it is the only node that allows Camera, Axis, DirectLight, SpotLight, EnvironmentLight and PointLight nodes to connect to it to bring into a scene. These nodes cannot connect to GeoMerge.

Note: Prims downstream from GeoScene with **Mask** set to **{lastmodified}** inherit from the strongest layer, the layer connected to the highest numbered input.

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.

Scopes and Xforms are similar in the way that they are both container prims. However, the most important distinction between a Scope and an Xform to be aware of is that Scopes cannot be transformed. To learn more about the workflow, see Creating Scope and Xform Prims.

Inputs and Controls

Connection Type	Connection Name	Function
Input	mat	The file containing the material you want to apply to the object.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoScope			
Path	prim_path	{nodename}	The root path of the new object. **Path** defaults a prim path variable **{nodename}** which is equal to the node name, such as GeoScope1 or GeoScope5.

Control (UI)	Knob (Scripting)	Default Value	Function
Create Missing Parents	parent_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Primitive Attributes			
Kind	kind	group	Sets the **Kind** associated with this object. 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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene. • **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default. • **render** - the object is the full resolution version for use when rendering the scene. • **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.
Visibility	visibility	inherited	Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance. • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.

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

```
#usda 1.0

def Xform "Cube"
    {
  def Cube "box" {
      double size = 4.0
  }
}
```

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.

GeoSelection

The GeoSelection 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 }
```

To learn more about the workflow, see Using GeoSelection.

Tip: GeoSelection'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
GeoSelection			
Mask	mask_ patterns	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.

Control (UI)	Knob (Scripting)	Default Value	Function
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
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.

GeoSphere

The GeoSphere node creates a sphere object in the scene with a prim path variable **{nodename}** which is equal to the node name, such as /GeoSphere1 or /GeoSphere5. You can change the prim path to update the scene graph as required.

You can translate, rotate, and scale the object locally, rather than using a dedicated GeoTransform node.

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.

See also GeoCard and GeoCube.

Note: GeoSphere and GeoCylinder have replaced the GeoRevolve node.

To learn more about the workflow, see Creating Prims in Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	mat	The file containing the material you want to apply to the object.

Control (UI)	Knob (Scripting)	Default Value	Function
GeoSphere Tab			
Path	prim_path	{nodename}	The root path of the new object. Path defaults to {nodename}.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Primitive Attributes			
Kind	kind	group	Sets the **Kind** associated with this object. 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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default. • **render** - the object is the full resolution version for use when rendering the scene. • **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference. **Note:** The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.
Visibility	visibility	inherited	Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance. • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.
Mesh Topology			
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

Control (UI)	Knob (Scripting)	Default Value	Function
			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 of the sphere.
Scales	scales	1, 1, 1	A scaling factor for each axis.
U Extent	u_extent	360	Sets the extent to which the input image wraps around the object horizontally without extrapolating from the image edges. 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.
V Extent	v_extent	180	Sets the extent to which the input image wraps around the object vertically without extrapolating from the image edges. 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.
Sweep Angle	theta_extent	360	Sets the angle of sweep around the X axis.
Sweep Center	theta_center	180	Sets the center angle of the sweep around the X axis.
XZ Angle	y_extent	180	Sets the sweep angle from the XZ plane.
XY Center	y_center	90	Sets the center angle from the XZ plane.
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.
Mesh Type	mesh_type	separate vertices	Determines how vertices and faces are affected by the **Subdivision** control:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **separate vertices** - edge vertices are separated so that they are not affected by **Subdivision**. • **shared vertices** - vertices are shared between the faces and end caps so that when **Subdivision** is enabled, the chosen smoothing method is applied. **Note:** 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. • **separate faces** - separate face meshes are added to the scene graph for the body and end caps. Enabling **Subdivision** has no effect.
Normals	normals	face-vertex	Sets the type of normals generated: • **none** - no normals are generated on the base prim, but may be generated by subdivision. • **face-vertex** - normals are generated for face vertices. **Tip:** Normals are not displayed in the Viewer by default. If you want to display normals in the Viewer, press **S** over the Viewer, go to the **3D** tab in the Viewer **Properties** panel, and enable the **show** > normals options by clicking the required buttons. See the Viewer node for more information.
Mesh Attributes			
Subdivision	subdivision_ scheme	none	Sets the subdivision method to apply when **Mesh Type** is set to **shared vertices.** • **catmullClark**: algorithm that smooths the

Control (UI)	Knob (Scripting)	Default Value	Function
			appearance of a mesh using recursive refinement to generate quadrilaterals • **loop**: algorithm that is defined recursively, dividing a triangle into four smaller ones • **bilinear**: algorithm that subdivides a mesh without smoothing the appearance • **none**: no subdivision is applied to the mesh **Note:** 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.
Boundary	interpolate_ boundary	none	Controls where interpolation is applied at boundaries between faces: • **none** • **edge only** • **edge and corner**
Double Sided	double_sided	off	When enabled, the selected color and opacity is applied to both sides of the object's faces.
Color/Opacity			
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.
Transform			
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and transform the object according to the transformation data in the channel file. Channel files contain a set of

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.
Display Tab			
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.

GeoSphereLight

The GeoSphereLight creates or edits a native USD sphere light prim which emits light in every direction.

See more about the workflow at Light Your Scene.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input to connect the light to your node graph.
	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
GeoSphereLight Tab			
Mode	mode	Create	Choose whether to **Create** or **Edit** the light prim.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path for the prims) created (e.g. \"/Scene/ Objects/Table"). If empty, the node name is used with a leading \"/\". The following may be used in the path to substitute text: {parent} - the default parent (if set). This may be set by an upstream node such as GeoScope. {nodename} - the name of this node
Create Missing Parents	create_missing_parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim

Control (UI)	Knob (Scripting)	Default Value	Function
			to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Lights	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Lights** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in the current node is

Control (UI)	Knob (Scripting)	Default Value	Function
			pushed to the geo nodes below it that have the default mask set.
Set From Prim	set_knobs_from_prim	N/A	When clicked this button gets the values from the prim at the current UI time and sets the knobs to these values.
Basic			
Intensity	inputs_intensity	1	Scales the power of the light linearly.
Exposure	inputs_exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	inputs_normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	inputs_color	1	Sets the color of the emitted light.
Enable Color Temperature	inputs_ enableColorTemperature	off	Enables using color temperature.
Color Temperature	inputs_colorTemperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.

Control (UI)	Knob (Scripting)	Default Value	Function
Radius	inputs_radius	0.5	The radius to use for the point light when modelled as a sphere.
Treat As Point	treatAsPoint	off	When enabled the light is treated as a point light by renderers that support this option. For renderers that don't support this (or when this option is disabled) the radius will be used and the light modelled as a sphere.
Refine			
Diffuse Multiplier	inputs_diffuse	1	A multiplier for the effect this light has on the diffuse response of materials.
Specular Multiplier	inputs_specular	1	A multiplier for the effect this light has on the specular response of materials.
ScanlineRender Options			
Falloff Type	slr_falloff_type	No Falloff	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination Mask	object_illumination_mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph

Control (UI)	Knob (Scripting)	Default Value	Function
			• **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_receive_shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Transform			
Snap	geosnap_operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a

Control (UI)	Knob (Scripting)	Default Value	Function
			custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation

Control (UI)	Knob (Scripting)	Default Value	Function
			parameters that you've applied to the object as a channel file. This is a useful method of sharing setups between artists.
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 **Ctrl**/**Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			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. You can hold down **Ctrl**/**Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
Local Matrix			
Prim Transform Order	xform_op_order	Prepend	Specifies the point at which this transform is applied to the prims (selected by the mask). USD prims support multiple transforms. This setting determines whether the transform should be applied before (Prepend) or after (Append) the upstream transforms, it replaces the existing transform (Replace) or does not change the current transform at all (No Change).
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

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.

Note: To learn more about masks, see Using Paths and Masks to Control the Scene.

To learn more about transformation workflows, see Transformations in 3D Scenes.

Tip: GeoTransform's classic 3D system equivalent is the TransformGeo node.

Tip: The GeoXform node has similar purposes, but is used for directly creating and modifying Xform prims.

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 **Mask** control determines which objects in the scene are affected.
	look at	An optional input where you can connect a 3D object to constrain to. When the **Type** of constraint is set to **Look At**, this becomes a **look at** input where the transformed 3D object is automatically rotated to point towards the **look at** input whenever it is moved. You can change the axis on which the object rotates, or change the **Type** of constraint on the **Constrain** tab. This can be useful, for example, if you have a 2D matte painting mapped to a Card in your scene. The **look at** 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.
	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 the GeoTransform node. 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
GeoTransform Tab			
Mask	mask_ patterns	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim (s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Snap	geosnap_	N/A	Choose what a selection in the Viewer or pivot point is

Control (UI)	Knob (Scripting)	Default Value	Function
	operation		snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_ scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and transform the input object according to the transformation data

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
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 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 **Ctrl/Cmd** 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 **Ctrl/Cmd** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			Ctrl/Cmd 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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.
Prim Transform Order	xform_op_order	Prepend	Determines when transforms should be applied to the objects specified in the **Mask** control: • **Prepend** - applies the transforms from this node before any other transforms applied to the object. • **Append** - applies the transforms from this node after any other transforms applied to the object.
Constrain Tab - controls on this tab are only enabled when the **look at** input is connected.			
Type	constraint	LookAt	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain

Control (UI)	Knob (Scripting)	Default Value	Function
			via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	+Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Rotate X	constraint_ rotate_x	on	Determines whether the constraint occurs around the X axis.
Rotate Y	constraint_ rotate_y	on	Determines whether the constraint occurs around the Y axis.
Rotate Z	constraint_ rotate_z	on	Determines whether the constraint occurs around the Z axis.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.

Control (UI)	Knob (Scripting)	Default Value	Function
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_ maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.

GeoTrilinearWarp

The GeoTrilinearWarp node warps meshes by moving the corners of its bounding box separately to create the warp.

To learn more about the workflow, see Using GeoTrilinearWarp.

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			

Control (UI)	Knob (Scripting)	Default Value	Function
Mask	mask_ patterns	Default - Injected/ All Meshes	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Meshes** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
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 (**p0-p7**) 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 (**p0-p7**).
Set Key	set_key_ shape	N/A	Sets keys for the positions of all the bounding box corners (**p0-p7**) on the current frame. This is the same as selecting **Set key** 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 (**p0-p7**) on the current frame.
Delete Anim	del_anim_ shape	N/A	Deletes the keys on the positions of all the bounding box corners (**p0-p7**) on all frames.
P0 xyz	p0	-0.5, -0.5, -0.5	Sets the x, y, and z coordinates for the **p0** 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 **p1** 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 **p2** 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 **p3** 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 **p4** 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 **p5** 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 **p6** 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 **p7** 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 **Use Incoming Bounding Box** 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 **Use Incoming Bounding Box** 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 **Use Incoming Bounding Box** 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 **Use Incoming Bounding Box** is disabled, sets the x, y, and z coordinates for one of the two custom bounding box corners you can adjust.

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.

GeoVisibility

The GeoVisibility node is used to show and hide objects in the scene. Hide causes the specified objects to become invisible.

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
GeoVisibility			
Mask	mask_ patterns	Default - Injected/ All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. For example, **/GeoCube 1 /GeoCard3** applies the effect to only those prims. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was. **All Cameras** - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Invert Selection	invert_mask	off	When turned off the prune method is only applied to the objects specified in the **Mask** control. When turned on, the prune method is applied to all objects in the scene not specified in the **Mask** control.

Control (UI)	Knob (Scripting)	Default Value	Function
Method	method	Hide	Sets the prune method to apply to objects: • **Hide** - hides the objects specified by the **Mask** pattern. Hidden objects behave as if they are invisible. • **Show** - shows the objects specified by the **Mask** pattern.

GeoXform

The GeoXform node allows you to create and edit **Xform prims** in your USD stage.

The **Create** mode allows you to create a new Xform in your stages scene graph hierarchy, for easier transformation of a group of prims.

Switching to **Edit** mode allows you to set the Path knob to an Xform that already exists in your scene graph and to directly edit its transformation values.

To learn more about the workflow, see Creating Scope and Xform Prims.

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 the GeoXform node. 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
GeoXform			
Mode	mode	Create	**Create** mode allows you to create a new Xform in your stages scene graph hierarchy. **Edit** mode allows you to set the Path knob to an Xform that already exists in your scene graph and to directly edit its transformation values.
Path (available in **Create** Mode)	prim_path	{nodename}	The root path of the new object. Path defaults to {nodename}.
Create Missing Parents	parent_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Create Missing Parents (Type)	parent_prim_type	Xform	Sets the type of prim to create if there are missing ancestors in the path.
Mask (available in **Edit** Mode)	mask_patterns	Default - Injected/All Roots	Specifies the mask pattern to match the prim names to affect. You can use standard glob-style wildcards, such as '*', '?', to create masks or use individual prim names separated by spaces. **Default - Injected/All Roots** - selects the default prim(s) for the node. The default will be the injected mask prim paths if there is an upstream node with this. Otherwise the default mask for this node type is evaluated. **All roots** - select the top level Xform(s) in your scene. **Last modified** - selects whatever the last node modified was.

Control (UI)	Knob (Scripting)	Default Value	Function
			All Cameras - selects all Cameras in your scene graph. **All Lights** - select all lights in your scene graph. **All Meshes** - selects all meshes in your scene graph. **Custom** - sets a custom selection of prims that exist in your scene graph.
Inject Mask	inject_mask	off	When enabled the mask in this node is injected into the node directly below it if that node has the default path mask set.
Primitive Attributes			
Kind	kind	group	Sets the **Kind** associated with this object. 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 **model** option is valid, but should not be used in most cases: • **model** - the root prim in the scene, which is a superclass of group and component. • **assembly** - used to denote an important group in the scene. • **group** - a container for other kinds. • **component** - a leaf kind, which cannot contain other kinds apart from subcomponents. • **subcomponent** - a special leaf kind for use in components.
Purpose	purpose	default	Sets the object's purpose, which can be used to control how a scene is rendered: • **default** - the object has no particular purpose and is rendered by default.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **render** - the object is the full resolution version for use when rendering the scene. • **proxy** - the object is a proxy version used for test purposes, which can be a lower resolution to decrease render times. • **guide** - the object is not rendered, but is visible in the Viewer for reference. **Note:** The **render**, **proxy**, and **guide** purposes are only displayed in the 3D Viewer when they are enabled in the Viewer **Properties** in the **3D** tab.
Visibility	visibility	inherited	Controls whether the object and its descendants are visible in the scene. Making objects invisible can increase scene performance. • **inherited** - the object's visibility is controlled by its parent. • **invisible** - the object and its descendants are invisible in the scene.
Color/Opacity			
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.
Transform			
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl/Cmd** 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. You can hold down **Ctrl/Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	
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. Check **specify matrix** 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.
Prim Transform	xform_op_ order	Prepend	Determines when transforms should be applied to the objects specified in the Path:

Control (UI)	Knob (Scripting)	Default Value	Function
Order			• **Prepend** - applies the transforms from this node before any other transforms applied to the object. • **Append** - applies the transforms from this node after any other transforms applied to the object.

MergeLayerShader

The MergeLayerShader 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**.

To learn more about the workflow, see MergeLayerShader: Merging Shaders.

Inputs and Controls

Connection Type	Connection Name	Function
Input	A	The two shaders you want to merge. The default merge operation is A **over** B.
	B	

Control (UI)	Knob (Scripting)	Default Value	Function
MergeLayerShader Tab			
Channels	channels	rgba	The shader merge is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
Also Merge	also_merge	none	Sets the shader channels that are merged in addition to those specified in the **channels** control.

Control (UI)	Knob (Scripting)	Default Value	Function
Operation	operation	over	Sets the merge operation to use: • **none** - No merge is calculated, only shader **B** affects the output. • **replace** - Replaces shader **B** with shader **A**. • **over** - This is the default operation. Layers shader **A** over **B** according to the alpha of shader **A**. Algorithm: **A+B(1-a)** • **stencil** - Only shows the areas of shader **B** that do not overlap with the alpha of **A**. Algorithm: **B(1-a)** • **mask** - Only shows the areas of shader **B** that overlap with the alpha of **A**. Algorithm: **Ba** • **plus** - The sum of image **A** and **B**. Note that **plus** may result in pixel values higher than 1.0. Algorithm: **A+B** • **max** - Takes the maximum values of both shaders. Algorithm: **max(A,B)** • **min** - Takes the minimum values of both images. Algorithm: **min(A,B)**

MtlXStandardSurface

The MtlXStandardSurface node enables you to view and render Autodesk Standard Surface for MaterialX shaders directly inside Nuke's new USD-based 3D system.

You can assign existing MaterialX Standard Surface materials to geometry, preview them accurately in the Hydra Viewer, and render them through ScanlineRender2.

You can adjust controls such as Base, Base Color, Diffuse, Roughness, and Metalness, as well as further options for Specular, Subsurface, Transmission, Coat, Sheen, Emission, Thin Film, and Geometry.

The following connections to texture maps are available: Base Color, Specular Color, Specular Roughness, Emission Color, Normal, Coat Normal, and Metalness.

To learn more about the workflow, see MtlXStandardSurface: MaterialX Shader.

ScanlineRender2 Limitations

EnvironmentLight: Indirect lighting is not currently supported in ScanlineRender which is why the environment light as well as object reflections will not be rendered using the MtlXStandardSurface node.

The EnvironmentLight in Nuke is currently for the purposes of generating specular reflections when using the ReflectiveSurface node among others. Currently as MtlXStandardSurface does not support reflections/refractions, the EnvironmentLight and USD Dome light will not display these reflected texture maps. For this workflow, you can apply a ReflectiveSurface shader and merge it over using a second ScanlineRender node.

Support for MaterialX Nodes

Since this implementation is focused on Autodesk Standard Surface, SLR2 only supports a limited set of MaterialX nodes that are required for the Nuke implementation of the Autodesk Standard Surface and these are:

- ND_standard_surface_surfaceshader
- ND_image_color3
- ND_image_vector3
- ND_image_float
- ND_normalmap

Other USD files with MaterialX nodes outside of the supported ones, will not render in SLR2, although they may still be visible in Hydra.

Standard surface knobs not supported

- Subsurface
    - subsurface
    - subsurface_color
    - subsurface_radius
    - subsurface_scale
    - subsurface_anisotropy
- Transmission
    - transmission
    - transmission_color
    - transmission_depth

- transmission_scatter
- transmission_anisotropy
- transmission_dispersion
- transmission_extra_roughness

- Geometry
  - opacity
  - thin_walled

Inputs and Controls

Connection Type	Connection Name	Function
Input	base Base Color	Connect a color or texture node to drive the base diffuse or metallic color (albedo) of the surface. Typically the main texture map.
	spec rough Specular Roughness	Connect a scalar or texture node to vary the specular roughness across the surface, controlling how sharp or soft reflections appear.
	metal Metalness	Connect a scalar or texture node to control how metallic the surface behaves. A value of 0.0 produces a non-metal (dielectric) response, while 1.0 makes the surface behave like a true metal. Intermediate values can blend between the two for stylized materials.
	norm Normal	Connect a normal or bump node to control the main surface normal used for lighting and reflections. Overrides the default geometry normal.
	emis Emission Color	Connect a color or texture node to drive the emission color of the material. Allows textured glow or light-based effects.
	spec Specular Color	Connect a color or texture node to define the tint or variation of the specular reflection. Useful for colored metals or tinted highlights.
	coat	Connect a color or texture node to tint the clear-coat layer. This affects the color of reflections in the coat, enabling subtle automotive-style

Connection Type	Connection Name	Function
	Coat Color	finishes or colored varnish effects.
	coat norm Coat Normal	Connect a separate normal map to control the direction of reflections for the clear-coat layer, independent of the base surface normal.
	Note: To find the hidden inputs, select the left edge of the node where there is a small black arrow, and drag outwards.	

Control (UI)	Knob (Scripting)	Default Value	Function
MtlXStandardSurface Tab			
Base	base	1	Controls the strength of the base layer that defines the diffuse or metallic contribution of the surface.
Base Color	base_color	0.8	Defines the base color or albedo of the material. For metals, this represents the reflective color; for non-metals, the diffuse colour.
Diffuse Roughness	diffuse_ roughness	0	Adjusts the microsurface roughness of the diffuse reflection, softening or sharpening how light scatters across the surface.
Metalness	metalness	0	Blends between a non-metallic (dielectric) and metallic surface response. A value of 0 produces diffuse materials; 1 produces fully metallic reflections.
Specular			
Specular	specular	1	Controls the intensity of specular reflection on the surface. Higher values increase reflected light brightness.
Color	specular_color	1	Tints the color of the specular reflection. Normally left white for energy-conserving materials.
Roughness	specular_ roughness	0.2	Controls the sharpness of reflections. Low values produce mirror-like highlights; higher values create broader, softer reflections.

Control (UI)	Knob (Scripting)	Default Value	Function
Index of Refraction	specular_IOR	1.5	Defines how light bends and reflects at the surface boundary. Typical values range from 1.3 (plastic/water) to 1.6 (glass) or higher for metals.
Anistropy	specular_ anisotropy	0	Introduces directional variation in reflections, producing stretched highlights typical of brushed or machined surfaces.
Rotation	specular_ rotation	0	Rotates the orientation of anisotropic reflections around the surface normal.
Subsurface			
Subsurface	subsurface	0	Controls the overall strength of subsurface scattering, simulating light transport within semi-translucent materials such as skin, wax, or marble.
Color	subsurface_ color	1	Sets the scattering color inside the material; often a lighter or more saturated tint of the surface colour.
Radius	subsurface_ radius	1	Determines how far light penetrates into the material before scattering out. Larger values increase softness and translucency.
Scale	subsurface_ scale	1	Global multiplier for the subsurface scattering effect, scaling all radius values simultaneously.
Anistropy	subsurface_ anisotropy	0	Adjusts the forward or backward scattering direction of light within the medium. Positive values favour forward scattering.
Transmission			
Transmission	transmission	0	Controls how much light passes through the material. A value of 1 makes the surface fully transparent.
Color	transmission_ color	1	Tints transmitted light, defining the color seen through the object.
Depth	transmission_ depth	0	Sets the absorption distance; thicker objects may appear more saturated or darker depending on color and depth.

Control (UI)	Knob (Scripting)	Default Value	Function
Scatter	transmission_ scatter	0	Adds internal scattering to the transmitted light, producing diffuse or milky transparency.
Anistropy	transmission_ anisotropy	0	Controls the angular bias of scattering inside the transmitted medium.
Dispersion	transmission_ dispersion	0	Simulates wavelength-dependent refraction, creating subtle color splitting (chromatic dispersion) in transparent materials.
Extra Roughness	transmission_ extra_ roughness	0	Adds additional roughness to transmitted light separate from the main surface roughness, useful for frosted glass or semi-diffuse transparency.
Coat			
Coat	coat	0	Enables a secondary reflective clear-coat layer on top of the base surface.
Color	coat_color	1	Defines the tint of the clear-coat reflection, typically white for neutral highlights.
Roughness	coat_ roughness	0.1	Controls the sharpness of coat reflections. Low values produce glossy highlights; higher values soften the coat reflection.
Anistropy	coat_ anisotropy	0	Introduces directionality to coat reflections for brushed clear-coat effects.
Rotation	coat_rotation	0	Rotates the orientation of the anisotropic coat highlight.
Index of Refraction	coat_IOR	1.5	Specifies the optical IOR of the coat layer, controlling reflectivity and Fresnel behavior.
Affect Color	coat_affect_ color	0.0	Determines how much the coat layer influences or modulates the underlying base color reflection.
Affect Roughness	coat_affect_ roughness	0.0	Defines how much the coat layer alters the perceived roughness of the layers below.
Sheen			
Sheen	sheen	0	Adds a soft, grazing-angle reflection layer suitable for

Control (UI)	Knob (Scripting)	Default Value	Function
			cloth and velvet-like materials.
Color	sheen_color	1	Sets the color tint of the sheen highlight.
Roughness	sheen_ roughness	0.3	Adjusts the softness of the sheen response; higher values produce broader, subtler effects.
Emission			
Emission	emission	0	Controls the intensity of light emitted by the surface, allowing it to appear self-illuminated.
Color	emission_color	1	Sets the emission color. Use bright colors for glowing or emissive materials.
Thin Film			
Thickness	thin_film_ thickness	0	Sets the physical thickness of the thin-film interference layer, affecting the color pattern of iridescence.
Index of Refraction	thin_film_IOR	1.5	Controls the optical density of the thin-film layer, influencing the range and strength of interference colors.
Geometry			
Opacity	opacity	1	Controls the transparency of the surface, blending between fully opaque (1) and fully transparent (0).
Thin Walled	thin_walled	off	Toggles whether the surface is treated as a single-sided thin sheet (true) or a solid volume (false). Use for leaves, glass panes, or surfaces without interior volume.

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 PointLight.

See also DirectLight, EnvironmentLight, and SpotLight.

To learn more about the workflow, see Light Your Scene.

Note: The USD native equivalent light node in the New 3D System is the GeoSphereLight.

Note: 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.
	scene	An input to connect the light to the rest of your scene such as a GeoScene node.

Control (UI)	Knob (Scripting)	Default Value	Function
PointLight Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_	N/A	This button allows you to take a node that is being

Control (UI)	Knob (Scripting)	Default Value	Function
	frame_link		passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location.
Basic			
Intensity	intensity	1	Scales the power of the light linearly.
Exposure	exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	color	1	Sets the color of the emitted light.
Enable Color Temperature	enable_color_ temperature	off	Enables using color temperature.
Color Temperature	color_ temperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.

Control (UI)	Knob (Scripting)	Default Value	Function
Radius	radius	0.5	The radius to use for the point light when modelled as a sphere.
Treat As Point	treat_as_point	on	When enabled the light is treated as a point light by renderers that support this option. For renderers that don't support this (or when this option is disabled) the radius will be used and the light modelled as a sphere.
Refine			
Diffuse Amount	diffuse	1	Sets the amount of diffuse reflection created by the light, such as light bouncing off soft furnishings and clothing.
Specular Amount	specular	1	Sets the amount of specular reflection created by the light, such as light bouncing off metal and other highly reflective surfaces.
ScanlineRender Options			
Falloff Type	falloff_type	Quadratic	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)
Illumination Mask	object_ illumination_ mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in

Control (UI)	Knob (Scripting)	Default Value	Function
			your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_ receive_ shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Shadow Channels	shadow_ channels	none	Output the shadow contribution to this channel. Lighting and shadowing must be enabled on ScanlineRender for these channels to be active.
Position Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used

Control (UI)	Knob (Scripting)	Default Value	Function
			elsewhere.
Source Prim	source_prim_path	N/A	Specify the source prim's scene graph location.
Constrain			
Apply Constrain to Local Parent TRS	local_parent_constrain_enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target .

Control (UI)	Knob (Scripting)	Default Value	Function
			Scale - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Maintain Offset Frame	constraint_ maintain_ offset	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Parent Translate	local_parent_ translate	0, 0, 0	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. When loading xform prim data from a scene file, the

Control (UI)	Knob (Scripting)	Default Value	Function
			prim's parent transform can be placed here.
Parent Rotate	local_parent_ rotate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Parent Scale	local_parent_ scale	1, 1, 1	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_ xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_ combine_ enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs. When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection

Control (UI)	Knob (Scripting)	Default Value	Function
			within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.

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 **Ctrl**/**Cmd** 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. You can hold down **Ctrl**/**Cmd** and drag the pivot point to a new location in the 3D Viewer.
Pivot Rotate	pivot_rotate	0, 0, 0	

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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/ Export Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used

Control (UI)	Knob (Scripting)	Default Value	Function
			elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location to load the prim.
Import From File	file_source_ enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's attribute data will be 'live' pulled into the node's parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_ enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them. The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Objects/Axis1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Axis1**.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.

Control (UI)	Knob (Scripting)	Default Value	Function
Create Missing Parents (Type)	parent_prim_type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to	locator_use_	on	Sets the locator color to the same color as the light

Control (UI)	Knob (Scripting)	Default Value	Function
Light Color	light_for_fill_color		itself.

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.

To learn more about the workflow, see PreviewSurface: USD Workflows.

Warning: PreviewSurface node is still in Beta and may error when a texture input is connected. We suggest the use of the MtlXStandardSurface node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	diff	Controls diffuse color in the shader preview.
	spec	Controls specular color in the shader preview.
	emis	Controls emission in the shader preview.
	rough	Controls roughness in the shader preview.
	opac	A hidden input that controls opacity in the shader preview.
	norm	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.

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 **diff** input.
Emissive Color	emissiveColor	0	Controls the amount of emissive color applied in the shader from the **emis** input.
Use Specular Workflow	useSpecularWorkflow	off	When enabled, PreviewSurface uses the specular workflow preferred by film pipelines. The **Specular Color** slider controls the amount of specularity applied in the shader. When disabled, PreviewSurface uses the metallic workflow preferred by games pipelines. The **Metallic** slider controls the amount of metallicity applied in the shader.
Specular Color	specularColor	0	Controls the amount of specularity applied in the shader from the **spec** input. This control is

Control (UI)	Knob (Scripting)	Default Value	Function
			only available when **Use Specular Workflow** is enabled.
Metallic	metallic	0	Controls the amount of metallicity applied in the shader from the **spec** input. This control is only available when **Use Specular Workflow** is disabled.
Roughness	roughness	0.5	Controls the amount of roughness applied in the shader from the **rough** 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 **opa** 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 **Opacity** value is ignored. **Opacity** values less than the threshold are not rendered and **Opacity** 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 **Clearcoat** 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 **Clearcoat** 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 **disp** 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 **mat** input, if the prim has one.

To learn more about the workflow, see Project3DShader: Projecting Textures.

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 **front** facing, **back** facing, or **both** polygons. Visibility of the point being projected on. Note this is both visibility to the projection camera and visibility of the surface's 'viewing angle', where this angle may be from a reflected object and not just the render camera.
Crop To Format	crop	on	When enabled, the input image is cropped at the edge of the camera frustum. When disabled, the last pixels of the 2D material within the camera frustum are extended to cover the prim.

Control (UI)	Knob (Scripting)	Default Value	Function
Near Plane Clip	near_clip_ enable	on	Clip projection closer than the near-plane distance. Input camera projection near plane is used.
Far Plane Clip	far_clip_ enable	on	Clip projection farther than the far-plane distance. Input camera projection far plane is used.
Occlusion Mode	occlusion_ mode	none	Sets the ray casting projection occlusion test mode: • **none** - occlusion testing is disabled. • **self** - only the geometry to which this shader is bound can occlude the projection. • **world** - any geometry in the scene can occlude the projection.

ReflectiveSurface

The ReflectiveSurface node allows you to generate mirror-like reflections, translucency, transmission and more from ScanlineRender's ray-tracing architecture.

To learn more about the workflow, see ReflectiveSurface: Generating Reflections.

Inputs and Controls

Connection Type	Connection Name	Function
Input	unnamed	An unnamed input for connecting the ReflectiveSurface node to your node graph.
	refl	An optional input to control reflection.
	trans	An optional input to control transmission.

Control (UI)	Knob (Scripting)	Default Value	Function
ReflectiveSurface Tab			
Visibility	sides_mode	both-sides	Choose whether material is visible for **both-sides**, **front-side** or **back-side** faces. Also toggle: **Camera** - material is visible to camera rays **Shadow** - material is visible to shadow
Reflection Percentage	reflection_ percentage	1	Amount of light reflection vs. transmission. From 0% - 100%, where 100% represents a mirror or chrome surface and 0% represents clear glass or plastic. Note that even at 0% reflectance the surface will reflect some light at acute angles due to the fresnel effect when the Fresnel Power control is > 0.
Reflection Tint	reflection_tint	1	Tint color of the reflection.
Transmission Tint	transmission_ tint	1	Tint color of the transmission.
Fresnel Bias	fresnel_bias	0.5	Fresnel effect bias (power). Sets the amount of reflectivity you see, typically based on the angle that you look at a surface.
Index of Refraction (ior)	index_of_ refraction	1.57	Index-of-refraction value of surface. Here's a list of commonly used values: vacuum 1.0, air @ stp 1.00029, ice 1.31, water @ 20c 1.33, acetone 1.36, ethyl alcohol 1.36, fluorite 1.433, fused quartz 1.46, glycerine 1.473, glass low 1.52, glass med 1.57 , glass high 1.62, diamond 2.417.
Surface Sides	sided_mode	prim-attrib	Hint to renderer that the surface backface should be shaded like the front, ie a thin double-sided surface. The default **prim-attrib** behavior is to retrieve the sides info from the primitive 'doubleSided' attribute, if it exists. This hint is important for the handling of normals on the surface backface especially when determining reflection/refraction angles. Set to **double** if the surface is open like a card mesh and

Control (UI)	Knob (Scripting)	Default Value	Function
			both front and back sides should be shaded. Set to **single** if the surface is closed like a cube or character mesh where only front faces should be shaded and backfaces are culled.

ScanlineRender

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's **Properties** panel has a variety of options for controlling sampling, camera/projection, motion blur, materials, lighting, and more.

ScanlineRender also has the ability to render reflections, refractions and more via ray tracing, giving you greater control when rendering directly from Nuke. In the Properties panel, you can adjust **Ray Options**, including the ability to control your **Ray Depth**.

Note: You can render more complex scenes with refractions and reflections using shader nodes, such as the ReflectiveSurface node.

In the **Output** tab, you can control render world space distance with 1/Z, Motion Vectors type and AOV outputs. Plus, the ScanlineRender node can output deep data if there is deep data available from the scene graph.

ScanlineRender supports an **Integrator** plugin API, which you can populate with your own integrators to visualize render data. See **Advanced** options in the table below.

Note: Nuke plugins named with the prefix 'slr' and suffix 'Integrator' appear in the list of available integrators to use in the node panel.

See also Camera.

For more information about ScanlineRender usage, see Render the Scene from 3D to 2D.

Tip: ScanlineRender's classic 3D system equivalent is also named ScanlineRender. For New 3D System scenes, make sure you are adding the New 3D System node (found in right click node menu under **3D** > **3D**, not the Classic one **3D** > **3D Classic**).

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: • A GeoScene or GeoMerge node that is connected to the objects and lights you want to render, or • a 3D object or prim.
	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 **root.format** or **root.proxy_format** defined in the **ProjectSettings**. 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			
Sampling			
Camera	camera_	1	Sets the number of samples to render per pixel, to

Control (UI)	Knob (Scripting)	Default Value	Function
Samples	sample_mode		produce motion blur and antialiasing. The total number of samples is the sampling grid size squared, or gridsize*gridsize. More samples means smoother motion blur and less aliasing, but a longer render time.
Custom Size (N*N)	camera_ samples_ custom	1	When camera samples is set to the 'custom' option, this value determines the camera sample grid width/height size. A value of 4 means a 4x4 grid of 1 samples.
Spatial Jitter At	spatial_jitter	2	When to enable the spatial (X/Y) jittering of the sampling screen location. If this is 2 and the camera samples >=2 then spatial jitter will be applied to all samples. This allows you to control at which sample levels to jitter spatial subpixel locations when doing anti aliasing so that you break up the patterns for better results.
Time Jitter At	time_jitter	2	When to enable random jittering in time. The default value is 2, which means jittering to produce motion blur occurs when samples are at a value 2 or higher. If samples are at 1, no motion blur will be created, but motion vectors will be produced so that you can still blur the image.
Scene Time Offset	scene_time_ offset	0	Shifts the time frame of input geometry, lights and cameras while keeping the renderer at the same output frame. This means you can slip your render in time (with subframe accuracy) without affecting the camera or the objects in the stage, which can be really helpful when you are trying to slip the camera to get vector motion blur aligned properly.
Camera/Projection			
Projection	projection_ mode	Render Camera	The preset projection modes are: • **Render Camera** - Take the projection mode from the camera.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Perspective** - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera. • **Orthographic** - use orthographic projection (projection onto the projection plane using parallel rays). • **Spherical** - 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. • **Cylindrical** - have the 360-degree world horizontally cylindrically projected around a camera. • **UV Unwrap** - have every object render its UV space into the output format. You can use this option to cook out texture maps
Shutter Length	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	Select when the shutter opens and closes in relation to the current frame value when motion blurring: • **centered** - to 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. • **start** - to 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. • **end** - to 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

Control (UI)	Knob (Scripting)	Default Value	Function
			to 30. • **custom** - to 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. Nuke has always defaulted to **start** and going forward in time, so at a given frame the shutter is open. However often it can be useful to change this to **end** when you want a motion blur trail to an impact point on a specific frame.
Shutter Segments	shutter_ segments	1	The number of 'time segments' used to interpolate motion blur. A segment count of 0 effectively disables motion blur, while a segment count of 1 creates a straight line blur. Increasing the number of segments beyond 1 subdives the straight line into more time segments, which is normally only necessary for heavy rotational blur. The greater the number of segments the greater the quality of rotational motion blur.
Shutter Bias	shutter_bias	0	Biases shutter towards shutter close or shutter open for stylized motion blur. Negative values bias towards shutter open and positive values bias towards shutter close.
Render Region	render_region_ mode	Format Extend	When the bg input has a larger pixel box than its format size, defines how the render should handle the entended bbox area outside the format's size. **Format** - render region is the format size, and any extended bbox pixels are passed through unchanged. **Format Extend** - render region is the format size, and automatically expanded to fill ant extended bbox area.

Control (UI)	Knob (Scripting)	Default Value	Function
			Format Clip - render region is the format size, and the output bbox is clipped to the format.
Overscan	overscan	0	The number of 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.
Motion Blur			
Camera Xform	camera_ motion_blur	on	Enable or disable the motion blur of a camera being transformed i.e. animating a Camera through space. Please note that subsampling matrices produce artifacts currently, as this requires quaternions for the matrix interpolation method which has not yet been implemented. As a workaround increase the Shutter Segments to chop up the frame you are generating the matrix for, into multiple matrices.
Camera Lens	camera_lens_ blur	on	Enable or disable the motion blur of a camera projection control being changed i.e. motion blur generated from animating the focal length of the camera
Object Xform	object_ motion_blur	on	Enable or disable the motion blur of an object being transformed i.e. animating a GeoCube through space (the mesh transform matrix is animated).
Object Deform	object_ deform_blur	on	Enable or disable the motion blur of an object being deformed i.e. an animated radius knob on a GeoSphere (the point xyz locations are animated).
Lights	light_motion_ blur	on	Enable or disable the motion blur of a light being transformed i.e. animating a light through space.
Ray Options			

Control (UI)	Knob (Scripting)	Default Value	Function
Max Ray Depth	ray_max_depth	10	Defines the maximum depth rays can 'bounce' to, allowing you to balance render performance and quality. Ray max depth is tested and incremented for all ray types, so the max depth can be a mix of ray types. For example, if the max depth is 4 then a ray bounce sequence like: ray# type 1 camera 2 glossy 3 glossy 4 diffuse 5 refraction will stop at the 'diffuse' ray bounce which is ray #4 in the sequence. However, if glossy max depth was set to only 1 then shading would stop at ray #2 terminating the sequence. The higher the number the more 'accurate' the render is, but at the cost of render time.
Diffuse Max	ray_diffuse_ max_depth	1	Diffuse rays will stop when this depth count is reached. The depth is incremented when a surface is shaded.
Reflection Max	ray_reflection_ max_depth	1	Glossy rays will stop when this depth count is reached. The depth is incremented when a surface is shaded.
Refraction Max	ray_refraction_ max_depth	2	Refraction rays will stop when this depth count is reached. The depth is incremented when a surface is shaded.
Use Camera Near	use_camera_ near	on	Disable this to use the manual near clipping distance below.
Use Camera	use_camera_	off	Enable this to use the input camera's far clip setting.

Control (UI)	Knob (Scripting)	Default Value	Function
Far	far		
Near/ Far Clipping	camera_ray_near_clip_distance	0.001 inf	Camera ray near clipping distance. Camera rays will not intersect anything closer than this distance. Note - this is the -radial- clipping distance from the camera's origin, -not- a clipping plane. A plane is like a straight wall in front of the camera while radial clipping is measured as the direct distance from the camera's location to an object.
Material			
Material Families	material_families	slr mtlx	List of material family names that the renderer will attempt to use for material connections, in search order priority. Default is 'slr mtlx' where 'slr' is the native material family for ScanlineRender and 'mtlx' is the MaterialX material family. If a material provides multiple output connections then they are matched in the order of the family list (ie 'slr' first, then 'mtlx'.) If no match is made then the material binding fails and the object will not be rendered.
Binding Mode	material_bind_mode	auto	How to resolve material binding attributes at each renderable prim: • **auto** - choose the best binding attribute in order of importance: 'full' then 'all purpose' ('preview' bindings are ignored and must be manually selected) • **full** - use only the 'full' binding attribute on the prim, if it exists • **preview** - use only the 'preview' binding attribute on the prim, if it exists • **all purpose** - use only the 'all purpose' binding attribute on the prim, if it exists • **off** - do not use any of the binding attributes on the prim, disabling the material
Side Visibility	side_visibility_	auto	This is a global override which takes precedence over

Control (UI)	Knob (Scripting)	Default Value	Function
	mode		per-prim settings. Sets whether the Material is visible for **front-side** (front faces), **back-side** (back faces), or **both-sides**. Note this is measuring the face's angle to the incoming ray direction, not the camera. Affects all ray types.
Texture 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
Lighting			

Control (UI)	Knob (Scripting)	Default Value	Function
(Lighting) Enable	lighting_ enable_mode	auto	Controls whether or not lights in the scene affect the 2D output. **auto**: renders with surface lighting when there are lights in the scene, or constant shading if no lights **on**: renders with surface lighting, but if no lights surfaces will appear black if not emissive **off**: renders constant shading, ignoring lights
Shadowing	shadowing_ enabled	on	Enable or disable shadowing cast from direct lighting.
Ambient	ambient	0	Enter a value between 0 (black) and 1 (white) to change the global ambient color. If you set 'Ambient' to 1.0 with a scene with no lights, the surfaces will emit their diffuse color as if illuminated equally from all directions.
Scene Masks			
Purpose Filter	prim_purpose_ filter_mode	all	Filter input scene prims by their purpose attribute. **all**: renders all prims regardless of purpose default: renders prims based on default settings for the stage **render**: renders all prims set to render purpose **proxy**: renders all prims set to proxy purpose **guide**: renders all prims set to guide purpose **all** disables purpose filtering so everything renders, and if **none** are enabled then nothing will be rendered.
Objects (Mask)	objects_mask	//*	Specifies the mask pattern to match prim names to include in the output scene, excluding light prims such as **DirectLight1**. The default mask, **//***, includes everything from the root

Control (UI)	Knob (Scripting)	Default Value	Function
			of the scene graph. As you can see, you can use standard glob-style variables, such as **/***, to create masks or use individual prim names separated by spaces. For example, **/GeoCube1 /GeoCard3** includes only those prims in the output scene. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Lights (Mask)	lights_mask	//*	Specifies the mask pattern to match light names to include in the output scene, excluding object prims such as **GeoCube1**. The default mask, **//***, includes everything from the root of the scene graph. As you can see, you can use standard glob-style variables, such as **/***, to create masks or use individual prim names separated by spaces. For example, **/DirectLight1 /PointLight4** includes only those light prims in the output scene. **Tip:** You can also use the cog menu, the Viewer picker, or drag and drop paths from the Scene Graph to create masks.
Outputs Tab			
1/Z	one_over_z	on	**On**: Output classic style Nuke Z is which 1/Z-distance. 'No Object' is black 0.0 and the Z value *decreases* the further from camera. Note that 1/Z is NOT normalized Z. 1/Z is easily converted back to absolute Z-distance by using another 1/Z. **Off**: Output absolute Z-distance where 'No-Object' = inf and the Z value increases the further from the camera. This is the world-space distance from the camera to the

Control (UI)	Knob (Scripting)	Default Value	Function
			object.
Motion Vectors	motion_ vectors_type	Distance	Select how to render motion vectors: **Off:** don't create any motion vectors **Distance**: stores the distance between the samples in the motion vector channel **Distance Normalized**: normalized distance between the samples in the motion vector channel **Velocity**: stores the velocity in the motion vector channel **Velocity Normalized**: normalized velocity in the motion vector channel
Surface AOVs			
Surface AOVs	output_aovs_ group	N/A	Defines which surface AOVs are output.
enable	aov_enable0 (0 is the first one in the list of 9)	on	Enables the AOV in the list.
aov source	aov_source0 (0 is the first one in the list of 9)	Zlinear	Source of Aov from shading results. A list of shading variable layers extended if geometry prims provide primvars. For example if a geometry mesh object provides a primvar named 'myUV' then it will appear at the end of this list along with its size (float, vec2, vec3, vec4. Predefined shading attributes: Cf- Geometry color (from primvar if available) Co - Geometry opacity (from primvar if available) presence - Surface presence (physical solidity) Oi - Surface rgb opacity (optical transparency)

Control (UI)	Knob (Scripting)	Default Value	Function
			Zlinear - U near-projected distance (classic Z) Zdistance - Camera ray distance Ps - Shading position Pg - Geometric position Ns - Shading normal Ng - Geometric normal Ts - Shading tangent UV- Surface parametric-uv coordinate (from primvar if available) UVW - Surface parametric-w (Z for volumes, from primvar if available) St - Texture coordinate (different than parametric-UV if modified by shader) MotionFwd - Forward motion-vectors MotionBwd - Backwards motion-vectors
merge mode	aov_merge_mode0 (0 is the first one in the list of 9)	min	Math to use when merging multiple surface samples in depth: • premult-blend - Premult A then Under(B + A*Aa*(1-Ba)) or Over(B*(l-Aa) + A*Aa) - best for data Aovs • blend - Under(B + A*(1-Ba)) or Over(B*(l-Aa) + A) - best for color Aovs • plus -B+A • min - min (B, A) - best for Z • mid -(B+ A)/2

Control (UI)	Knob (Scripting)	Default Value	Function
			• max - max(B, A)
unpremult	aov_unpremult_mode0 (0 is the first one in the list of 9)	coverage	Unpremult this Aov by coverage or alpha channel.
output layer	aov_output0 (0 is the first one in the list of 9)	depth	Output channels to route Aov to.
Deep Options			
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. When disabled, deep samples with an alpha value 0 contribute to the output.
Advanced Tab			
Integrator	integrator_type	Default	• With the Integrator knob set to **Default**, ScanlineRender will render utilising the new ray tracing architecture and act as a standard utility renderer. You can use the options to the right to **Reverse Order**, switch to rendering in **Uv Mode**, or simply only output the render without the background input using **Render only** mode. • If you switch the Integrator knob to **Debug** mode, it gives you access to rendering your scene in different shading contexts, such as normals and texture coordinates. **Note: Debug** mode is an experimental option and currently not fully functional.

Control (UI)	Knob (Scripting)	Default Value	Function
Reverse Order	reverse_order	off	Reverse the shading order from farthest surface to nearest surface.
Render Only	render_only	off	Output only the render against black (zeros) don't overlay on background input.
Sample	diagnostic_ sample	-1	Selects samples for diagnostic mode, if enabled.
Pixel	diagnostic_ pixel	x=-1 y=-1	Pixel coordinates to test or debug information at, for diagnostic mode.

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.

To learn more about the workflow, see Light Your Scene.

Note: The USD native equivalent light node in the New 3D System is the GeoDiskLight.

Tip: SpotLight's classic 3D system equivalent is the Spot node.

Inputs and Controls

Connection Type	Connection Name	Function
Input	look at	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.
	scene	An input to connect the light to the rest of your scene such as a GeoScene node.

Control (UI)	Knob (Scripting)	Default Value	Function
SpotLight Tab			
Live Read	read_from_scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.

Control (UI)	Knob (Scripting)	Default Value	Function
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location.
Basic			
Intensity	intensity	50000	Scales the power of the light linearly.
Exposure	exposure	0	Scales the power of the light exponentially as a power of 2, similar to an Fstop control. The result is multiplied against the intensity.
Normalize	normalize	off	When enabled this option keeps the power of the light constant when the size of the light is altered. (This is the size of the light prim itself, not the locator in the Viewer.) This makes it easier to independently adjust the intensity/exposure and size of the light because the total illumination provided will not vary with the area or angular size of the light. May not be respected by all light shader implementations.
Color	color	1	Sets the color of the emitted light.
Enable Color Temperature	enable_color_ temperature	off	Enables using color temperature.
Color Temperature	color_ temperature	6500	Color temperature, in degrees Kelvin, representing the white point of the light. When enabled the rgb converted result multiplies against the 'Color' control. The default is a common white point 6500k, or D65. Lower values are warmer and higher values are cooler with a valid range from 1000k to 10000k.
Radius	radius	0.5	The radius defines the size of the light's source disk.
Cone Angle	cone_angle	20	Angular diameter of the light in degrees. The light will be cone shaped at smaller angles and behave more like a spot light.
Cone Softness	cone_softness	0	The softness of the cone angle; typically a value of 1 is used for a soft gradation, while 0 would give the cone

Control (UI)	Knob (Scripting)	Default Value	Function
			angle a hard cut-off. Values greater than 1 can be used to further soften the gradation. The effect of this option is visible from ScanlineRender and not the 3d viewer.
Refine			
Focus	focus	0	Affects the spread of the light. The greater the value the more focused the light is. Lower values result in a diffused effect.
Focus Tint	focus_tint	0	Change the color tint of the light in the falloff region determined by the focus property. The effect of this option is visible from ScanlineRender and not the 3d viewer.
Diffuse Amount	diffuse	1	A multiplier for the effect this light has on the diffuse response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
Specular Amount	specular	1	A multiplier for the effect this light has on the specular response of materials. Note that this is a non-physical control and can break energy-conservation calculations. May not be respected by all light shader implementations.
ScanlineRender Options			
Falloff Type	falloff_type	Quadratic	Light falloff type controls how much light the object gets from the light source. It is based on the distance between the light source and the object. **No Falloff** will not diminish the light. A **Linear** type will diminish the light at a fixed rate as it travels from the object. **Quadratic** and **Cubic** types will diminish the light at an exponential rate. (ScanlineRender only option)

Control (UI)	Knob (Scripting)	Default Value	Function
Illumination Mask	object_ illumination_ mask	Custom	The matched objects here will be illuminated by this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Cast Shadow	cast_shadow	enabled	Enable or disable shadow casting for this light. When enabled, the light will cast shadows in the scene.
Receive Shadow Mask	object_ receive_ shadow_mask	Custom	The matched objects here will receive shadowing from this light. Specify patterns to match prim names to using standard glob-style wildcards '*', '?'. There can be multiple mask patterns separated by spaces. • **All Roots** - selects the top level Xform(s) in your scene graph • **All Meshes** - selects all meshes in your scene graph • **Custom** - sets a custom selection of prims that exist in your scene graph
Shadow Channels	shadow_ channels	none	Output the shadow contribution to this channel. Lighting and shadowing must be enabled on ScanlineRender for these channels to be active.
Position Tab			
Live Read	read_from_ scene_link	on	If enabled read values from the source prim attributes dynamically into the knobs. If disabled the knobs switch

Control (UI)	Knob (Scripting)	Default Value	Function
			into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs. They are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location.
Constrain			
Apply Constrain to Local Parent TRS	local_parent_ constrain_ enable	off	Enabling this will apply any constrain transform only to the Local Parent Translate/Rotate/Scale controls, leaving the Local Xform controls available for application -after- the constrain is applied. This reduces the need for parenting connections. For example a light can be Local Parent constrained to a surface point while allowing the light to be translated back from the object via Local Axis.
Type	constraint	Look At	The type of constraint: **Look At** - Allows your constrained prim to always face and look at the target prim you are constraining to. **Parent** - Modifies the prim's transformation as if the target was the parent hierarchically. Allows your constrained prim to match the translation, rotation and scale of the target prim and allows you to set whether you want that transformation to be absolute or relative to the constrained prims existing location in world

Control (UI)	Knob (Scripting)	Default Value	Function
			space, using the maintain offset knob. **Transformation** - Matches the location, rotation and scale of the prim to the those of the target. Acts similarly to the Parent constraint but is a quick way to constrain via translation or rotation. **Translation** - Matches the location transformations of the prim to that of the target. **Rotation** - Matches the rotation transformations of the prim to that of the target . **Scale** - Matches the scale transformations of the prim to that of the target.
Orientation Axis (Look At only)	constraint_ orient_axis	-Z	Orientation axis of the effect. Applies to following types of constraint: LookAt. Also has controls for enabling and disabling the X Y Z axes rotation.
Strength (Look At only)	constraint_ strength	1	Strength of the effect. Applies to following types of constraint: LookAt.
Translate (Parent and Transformation only)	constraint_ apply_ translate	on	Enables or disables the translation for the constraint for Parent and Transformation Types only.
Rotate (Parent and Transformation only)	constraint_ apply_rotate	on	Enables or disables the rotation for the constraint for Parent and Transformation Types only.
Scale (Parent and Transformation only)	constraint_ apply_scale	off	Enables or disables the Scale for the constraint for Parent and Transformation Types only.
Maintain Offset Frame	constraint_ maintain_	off, 0	When enabled, the prim maintains the relative offset between itself and the target at the specified offset

Control (UI)	Knob (Scripting)	Default Value	Function
	offset		frame.
Maintain Offset Frame (Set to Current Frame)	constraint_ set_maintain_ offset_frame	N/A	Set the frame to use to the current frame for maintain offset calculation.
Local Parent Xform			
Translate	local_parent_ translate	0, 0, 0	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Rotate	local_parent_ rotate	0, 0, 0	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. 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	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. When loading xform prim data from a scene file, the prim's parent transform can be placed here.
Local Axis Xform			
Local Xform Sync	sync_local_ xform	on	If enabled extract the prim's local Xform. If the 'Combine With Parent' control is enabled the local and parent Xforms are combined.
Combine With Parent	parent_ combine_ enable	off	If enabled the parent prim Xform is combined (concatened) with the local prim Xform and placed in the local-Xform TRS knobs.

Control (UI)	Knob (Scripting)	Default Value	Function
			When not enabled the parent prim Xform is extracted separately and placed in the local parent Xform TRS knobs, while the local primXform is extracted and placed in the local axis Xform TRS knobs.
Snap	geosnap_ operation	N/A	Choose what a selection in the Viewer or pivot point is snapped to in the Viewer: • **Geo to** Set your geometry to a vertex selection within the scene. • **Geo to** Set your geometry to a vertex selection within the scene in a frame range. • **Geo to** Snaps your geometry by using a custom script. • **Pivot Point to** Set your pivot point to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to a vertex selection within the scene in a frame range. • **Pivot Point to** Set your geometry to the selected prim's bounding box within the scene. Click knob to select which part of the bounding box to snap to. • **Pivot Point to** Snaps your pivot point by using a custom script.
(Snap) T	geosnap_ translate	on	Sets the translation to the selection within the scene.
(Snap) R	geosnap_ rotate	off	Sets the rotation to the selection within the scene.

Control (UI)	Knob (Scripting)	Default Value	Function
(Snap) S	geosnap_scale	off	Sets the scale to the selection within the scene.
Transform Data	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
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 **Ctrl**/**Cmd** 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.

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 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. You can hold down **Ctrl**/**Cmd** 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. Check **Specify Matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Import/ Export Tab			
Live Read	read_from_	on	If enabled read values from the source prim attributes

Control (UI)	Knob (Scripting)	Default Value	Function
	scene_link		dynamically into the knobs. If disabled the knobs switch into normal/local mode. Note that in this dynamic mode the values are not baked into keyframes in the knobs hey are dynamically created as if they were an expression. This means that the node will always update to the latest prim state.
Snapshot Frame	snapshot_ frame_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame onto the node - this can then be copied and used elsewhere.
Snapshot Range	snapshot_ range_link	N/A	This button allows you to take a node that is being passed through and bake the data from a frame range onto the node - this can then be copied and used elsewhere.
Source Prim	source_prim_ path	N/A	Specify the source prim's scene graph location to load the prim.
Import From File	file_source_ enabled	off	If enabled an external scene file is used to retrieve prim attribute data, overriding the scene input connection which is ignored. If a valid source prim path specified that prim's attribute data will be 'live' pulled into the node's parameters - not baked into knob curves. A valid path to the input prim must be specified otherwise the node will produce an error.
File Path	file	N/A	Path to external scene file, if scene input is not connected
Reload	reload	N/A	Force-update the scene source data. Typically used when file contents have changed but Nuke is not aware of the change.
Rotations Euler Filter	euler_filter_ enable	on	When enabled, check for possible Euler flips in the decomposed rotation curves and remove them.

Control (UI)	Knob (Scripting)	Default Value	Function
			The Euler filter can help to avoid discontinuity in rotations.
Output Prim Path	prim_path	none	Sets the scene graph path for the new camera prim, such as **/Scene/Objects/Axis1**. If the output path is left blank, the node name is used with a preceding **/** (forward slash). For example, **/Axis1**.
Create Missing Parents	create_ missing_ parents	on	When turned on, this will create the missing ancestor prims which don't already exist in the path. When off, missing ancestors will be pure overs (i.e. overrides), which will cause the prim to not appear in the scene graph or render unless the parent prim 'overs' are turned into 'concrete' prims.
Create Missing Parents (Type)	parent_prim_ type	Xform	The type of prim to create for any ancestor prims in the path which don't already exist.
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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **wireframe** - displays the wireframe plus the surface texture.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The Viewer node **3D** > **display** setting overrides this control.
Selectable	selectable	on	Turn off to prevent picking with the mouse in the viewer.
Editable	editable	on	Turn off to prevent changing values when manipulating in Viewer.
Fixed locator size	locator_fixed_size	off	When checked, the locator will be drawn in a fixed size regardless of current camera/zoom settings.
Locator Fill Color	locator_fill_color	N/A	The fill color used for the locator when the light color isn't being used.
Set locator to Light Color	locator_use_light_for_fill_color	on	Sets the locator color to the same color as the light itself.

WireframeShader

The WireframeShader node is used to apply a wireframe material to a prim.

To learn more about the workflow, see WireframeShader: Applying Wireframe Overlay.

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	The material is only applied to these channels. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
operation	operation	opaque	Sets the wireframe render mode: • **opaque** - displays wires over a fully solid black geometry. • **see through** - displays wires over a full transparent geometry. • **over** - displays wires over the input shader. • **multiply** - displays wires multiplied by the input shader over a fully transparent geometry. • **modulate** - modulates the wires' color by a standard diffuse contribution and displays over the input shader. This mode is affected by any lights in the scene.
Face edges only	face_edges	off	Display just the face edge wires rather than all triangle wires.
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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

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
			• **off** - hides the 3D object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
filter	filter_type	all	Select the geometry objects to which the material is applied: • **all** - apply the material to all incoming geometry objects. • **name** - only apply the material to incoming geometry objects that match the filter name settings. **Note:** For **name** 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.
	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
			• **equals** - set the material on any objects whose name matches the string in the filter name field exactly. • **doesn't equal** - set the material on any objects whose name does not match the string in the filter name field exactly. • **contains** - set the material for any objects whose name contains the string in the filter name field. 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 **contains** and set the filter name field to **chair** to apply the material to all parts of the chair while leaving the table alone. • **doesn't contain** - set the material for any objects whose name does not contain the string in the filter name field. This control is only available when **filter** is set to **name**.
	filter name	N/A	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 **choose** button to select a filter name from a list of incoming geometry objects. This control is only available when **filter** is set to **name**.
choose	filter_refresh	N/A	Open the **Object Name Chooser** dialog. This allows you to select a filter name from a list of incoming geometry objects. This control is only available when **filter** is set to **name**.

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.

Note: Axis's New 3D system equivalent node is also named Axis. For Classic 3D System scenes, make sure you are adding the Classic 3D System node (found in right click node menu under **3D** > **3D Classic**, not the New one **3D** > **3D**).

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 the TransformGeo node. If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.
	look	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 **look** input is moved.

Control (UI)	Knob (Scripting)	Default Value	Function
Axis Tab			
read from file	read_from_file	disabled	When disabled, the axis is configured using the controls on the **Axis** tab. Enable **read from file** if you want to read in axis information from an .fbx file using the **File**

Control (UI)	Knob (Scripting)	Default Value	Function
			tab. **Note:** This control is linked to the **read from file** control on the **File** 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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid** + **lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **lines** - displays the wireframe plus the surface texture. **Note:** The Viewer node **3D** > **display** setting overrides this control.
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	Select to import or export a channel file: • **Import chan file** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the objects attached to the Axis are snapped to a new position depending on the points selected. • **Match selection position, orientation** - the objects attached to the Axis are snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the objects attached to the Axis are 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 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 **Ctrl/Cmd** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
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 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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
File Tab			

Control (UI)	Knob (Scripting)	Default Value	Function
read from file	read_from_file	disabled	When disabled, the axis is configured using the controls on the **Axis** tab. Enable **read from file** if you want to read in axis information from an .fbx file. **Note:** This control is linked to the **read from file** control on the **Axis** 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 file.
USD Options	scene_graph	N/A	When the **file** path is pointing to a valid **.usd** file, the **USD Options** are displayed. The **USD Options** show a scenegraph containing a list of the item names and their paths inside the **.usd** file. Click an item to select it and load it into the scene. The selected item can be identified in the **Load** column. Items in the **.usd** file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene. **Note:** For more information about importing Axes from a **.usd** file, see Importing USD Items.
animation stack name	fbx_take_name	N/A	When the **file** control is pointing to a valid .fbx file, select the required **take name** from the dropdown menu.
node name	fbx_node_name	N/A	When the **file** control is pointing to a valid .fbx file, select the required **node name** from the dropdown menu.
frame rate	frame_rate	24	When **use frame rate** is enabled, enter the required frame rate to use instead of the rate specified in the input file.

Control (UI)	Knob (Scripting)	Default Value	Function
use frame rate	use_frame_ rate	disabled	When enabled, the frame rate from the input file is ignored and the specified **frame rate** is used instead.
Look Tab			
look axis	look_axis	-Z	The axis around which the Axis is rotated to face the **look** 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 **look** 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 **look** 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 **look** 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 **look** 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 **min shininess**. Where the mask is white, the shininess is set to **max shininess**. 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 **specular** 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 **emission** 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 **diffuse** are limited to the non-black areas of the mask.
	unnamed	Either: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
BasicMaterial Tab			
channels	channels	rgb	The effect is only applied to these channels.

Control (UI)	Knob (Scripting)	Default Value	Function
			If you set this to something other than **all** or **none**, 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 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	Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** 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 **min shininess**. Where the matte is white, the shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly. If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
max shininess	max_shininess	10	Sets the shininess value controlling the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** input of the node, pixel values in the mask are used to vary the

Control (UI)	Knob (Scripting)	Default Value	Function
			shininess value. Where the matte is black, the shininess is set to **min shininess**. Where the matte is white, the shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly. If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
shininess channel	shininess_ channel	luminance	Selects which channel from the **mapSh** input is used to map the black and white values to the **minshininess** and **maxshininess** controls. Choose: • **red** - use the red channel for the mapping. • **green** - use the green channel. • **blue** - use the blue channel. • **alpha** - use the alpha channel. • **luminance** - use the luminance. • **average rgb** - use the average of the red, green, and blue channels.

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	The effect is only applied to these channels. You can use the checkboxes on the right to select individual channels.
operation	operation	over	Select how you want to composite the BlendMat node's input material and the background pixels together: • **none** - set the material to black. • **replace** - show the material where the material and the background overlap. • **over** - composite the material over the background pixels according to the material's alpha. • **stencil** - 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. • **mask** - 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. • **plus** - add the background pixels to the material.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **max** - use the material if its pixel values are greater than the background pixels or else use the background pixels. • **min** - use the material if its pixel values are less than the background pixels or else use the background pixels.
surface blend	surfaceblend	input fragment	Determines how the input texture blends with the vertex color of the geometry to which the shader is applied: • **input texture** - only use the input texture. • **vertex color** - only use the vertex color. • **modulate** - texture * vertex color. • **plus** - texture + vertex color. • **over** - (texture + ((1 - a) * vertex color)). • **subtract** - texture - vertex color.

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.

Note: Camera's New 3D system equivalent node is also named Camera. For Classic 3D System scenes, make sure you are adding the Classic 3D System node (found in right click node menu under **3D** > **3D Classic**, not the New one **3D** > **3D**).

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 the TransformGeo node. If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.
	look	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 **look** input is moved.

Control (UI)	Knob (Scripting)	Default Value	Function
Camera Tab			
read from file	read_from_file	disabled	When disabled, the camera is configured using the controls on the **Camera** tab. Enable **read from file** if you want to read in camera information from a file using the **File** tab. **Note:** This control is linked to the **read from file** control on the **File** tab.
display	display	wireframe	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. • **off** - doesn't display the camera geometry. • **wireframe** - displays only the outlines of the camera geometry. • **solid** - displays the camera geometry with a solid color.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **solid** + **lines** - displays the camera geometry as solid color with the camera's geometry outlines. • **textured** - displays only the surface texture. • **textured** + **lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the camera is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the camera is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the camera 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.

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 **Ctrl/Cmd** 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	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. You can also hold down **Ctrl/Cmd+Alt** 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 camera 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 camera's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Projection Tab			
projection	project_mode	perspective	Sets the camera projection type when projecting 2D textures: • **perspective** - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture. • **orthographic** - objects are viewed using parallel projection. • **uv** - every object renders its UV space into the output format. Use this to cook out texture maps. • **spherical** - the entire 360° world is rendered as a spherical map.
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. **Note:** The value for the **near** clipping plane must always be positive to produce a sensible result.
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	When disabled, the camera is configured using the controls on the **Camera** tab. Enable **read from file** if you want to read in camera information from a file using the **File** tab. **Note:** This control is linked to the **read from file** control on the **Camera** tab.
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	When the **file** path is pointing to a valid **.usd** file, the **USD Options** are displayed. The **USD Options** show a scenegraph containing a list of the item names and their paths inside the **.usd** file. Click an item to select it and load it into the scene. The selected item can be identified in the **Load** column.

Control (UI)	Knob (Scripting)	Default Value	Function
			Items in the **.usd** file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene. **Note:** For more information about importing Cameras from a **.usd** file, see Importing USD Items.
animation stack name	fbx_take_name	N/A	When the **file** control is pointing to a valid file, select the required **take name** from the dropdown menu. **Note:** This control is only displayed if you have selected an **.fbx** file in the **file** control.
node name	fbx_node_name	N/A	When the **file** control is pointing to a valid file, select the required **node name** from the dropdown menu. **Note:** This control is only displayed if you have selected an **.fbx** file in the **file** control.
frame rate	frame_rate	24	When **use frame rate** 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 **frame rate** is used instead.
suppress confirmation dialog	suppress_dialog	disabled	When enabled, importing new camera data does not display a confirmation prompt.
compute rotation	compute_rotation	disabled	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.

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 **look** 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 **look** 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 **look** 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 **look** 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 **look** 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	An optional input to use as a mask. By default, feature tracking is limited to the non-black areas of the mask. The **Mask** input is hidden until the **Source** input is connected.

Control (UI)	Knob (Scripting)	Default Value	Function
CameraTracker Tab			
Input			
Source	sourceType	Sequence	Sets the type of source footage you intend to track: • **Sequence** - designed to track a contiguous frame sequence with minimal intervention from you. • **Stills** - 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.
Mask	ignore	None	Set the mask type to exclude areas of the sequence when tracking: • **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the source clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the source clip to define which areas to ignore. • **Mask Luminance** - use the luminance of the Mask input to define which areas to ignore.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Mask Inverted Luminance** - use the inverted luminance of the Mask input to define which areas to ignore. • **Mask Alpha** - use the Mask input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted Mask input alpha channel to define which areas to ignore.
Range	trackRange	Input	Sets the range of frames processed by CameraTracker: • **Input** - the default value, sets the frame range to the length of the sequence attached to the Source input. • **Global** - sets the tracking frame range to the range set in the **Project Settings** > **frame range** controls. If no frame range is defined, the frame range of the first image you read in is used as the Global frame range. • **Custom** - sets a tracking range of frames described by the **from** and **to** fields. • **Reference Frames** - 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 **Add** dropdown. This option should only be used if you have set **Source** to **Stills**.
from	trackStart	Dependent on the **Project Settings**	When **Range** is set to **Custom**, this control sets the first frame to track in the footage.
to	trackStop	Dependent on the **Project Settings**	When **Range** is set to **Custom**, 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
			solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
	addReferenceFrame	N/A	Adds the current frame to the set of frames to track and solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
	deleteReferenceFrame	N/A	Removes the current frame from the set of frames to track and solve. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Add	addReference-FramesMenu	Add	Allows you to quickly add reference frames: • **Add All** - Adds all frames based on the input's start and end range. Any missing frames on the input clip are skipped. • **Add Range** - Opens a dialog that lets you select a specific frame range to add. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Delete	deleteReference-FramesMenu	Delete	Allows you to quickly remove reference frames:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Delete All** - Removes all reference frames. • **Delete Range** - Opens a dialog that lets you select a specific frame range to remove. **Note:** This control is only available when **Range** is set to **Reference Frames**.
Camera			
Principal View	principalView	left	Sets the principal view where features are tracked and the **Mask** input is applied. The secondary camera is calculated relative to this **Principal View** camera. This control also appears on the **Settings** tab. **Note:** Principal View 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).
Camera Motion	cameraMotionLink	Free Camera	Sets the type of camera motion to compensate for: • **Rotation Only** - select this if the camera is stationary, but rotating. • **Free Camera** - select this if the camera is moving freely, rotating, and translating. • **Linear Motion** - select this if the camera motion is a straight, linear path. • **Planar Motion** - select this if the camera has a flat path, moving in a two-dimensional plane only.

Control (UI)	Knob (Scripting)	Default Value	Function
Lens Distortion	lensDistotionTypeLink	No Lens Distortion	Specifies the type of lens distortion expected: • **No Lens Distortion** - treats the footage as having no distortion. Use this option if the **Source** footage has already been corrected to remove lens distortion. • **Unknown Lens** - calculates the lens distortion automatically from the sequence (in the same way as the Image **Analysis** tab in the LensDistortion node) and then refines the distortion in the camera solve.
Undistort Input	undistort	off	When enabled, the **Source** is undistorted based on the calculated lens.
Focal Length	focalLengthType	Unknown Constant	Sets the focal length for the camera: • **Known** - select this option if the focal length is available and enter a value in the **Length** control. • **Approximate Varying** - select this option if an approximate focal length is available and enter keyframed focal length values in the **Length** control. • **Approximate Constant** - select this option if an approximate focal length is available and there is no zoom, and enter a focal length value in the **Length** control. **Note:** CameraTracker attempts to refine the focal length during the solve if you select an **Approximate** option. • **Unknown Varying** - select this option if the focal length is unknown and changing. • **Unknown Constant** - this is the default

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 **Film Back Size** (mm or inches).
Film Back Preset	filmBackSizePresets	Custom	Sets the **Film Back Size** controls automatically, depending on which preset you choose. The default setting allows you to enter your own settings manually. **Tip:** You can add your own defaults by editing the **../NukeScripts/camerapresets.py** file in the Nuke installation package.
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 **Units** dropdown. The units should match the units used for the **Length**.
Units	filmbackUnits	mm	Sets the unit of measure for the **Film Back Size**, either millimeters or inches.
Analysis			
Track	trackFeatures	N/A	Click to begin auto-tracking using the controls specified in the **Settings** 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 **Settings** tab **Tracking** 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 **Settings** 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	Click to update the solve calculation, such as when you have extended the frame range or used some of the **Settings** tab **Solving** refinement controls. 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.
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	Determines how the track and solve data is used when you click Create: • **Camera** - creates a single animated camera. • **Camera rig** - creates an animated camera for each view in the script and a JoinViews to node to pass the animation downstream. • **Scene** - creates a single animated camera, a point cloud from the solved 3D points, and a Scene node. • **Scene+** - creates a scene containing all the components included in the other create modes. • **Point cloud** - creates a point cloud from the solved 3D points. • **Distortion** - creates a LensDistortion node with **Undistort** disabled. • **Undistortion** - creates a LensDistortion node with **Undistort** enabled. • **Cards** - creates a 3D card for each solved frame in the sequence. **Note:** Creating Cards from sequences can take long time, depending on the number of frames present.
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	Sets the 3D system with which the **Export** nodes are compatible: When enabled, clicking the **Create** button adds the selected new 3D system nodes to the Node Graph. New 3D system nodes are red by default. When disabled, clicking the **Create** 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 **Project Settings**	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. 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).
[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 **Project Settings**	Sets the view for the track curves. 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).
[track curves]	trackCurves	N/A	Displays the following track and solve information in the form of curves: • **num tracks** - the number of tracked features at each frame. • **track len - min** - the minimum length of the tracks at each frame (in frames).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **track len - avg** - the average length of the tracks at each frame (in frames). • **track len - max** - the maximum length of the tracks at each frame (in frames). • **Min Length** - the threshold for minimum track length. You can adjust the minimum using the Min Length control. • **Solve Error** - displays the constant Solve Error parameter. • **error min** - the minimum reprojection error at each frame (in pixels). • **error rms** - the root mean reprojection error at each frame (in pixels). • **error track** - the maximum root mean reprojection error calculated over the track lifetime at each frame (in pixels). • **error max** - the maximum reprojection error at each frame (in pixels). • **Max Track Error** - displays the constant Max RMS Error parameter. You can adjust the maximum using the **Max Track Error** control. • **Max Error** - displays the Max Error threshold parameter. You can adjust the maximum using the **Max Error** control.

Control (UI)	Knob (Scripting)	Default Value	Function
Min Length	minLengthThreshold	0	Redefines your thresholds if you find your solve or camera output needs adjusting: • **Min Length** - 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. • **Max Track Error** - reduce this threshold to reject tracks based on RMS reprojection error. • **Max Error** - reduce this threshold to reject tracks with a large reprojection error in isolated frames.
Max Track Error	maxRMSEThreshold	0	
Max Error	maxErrorThreshold	0	**Note:** Feature tracks that fall within the threshold limits are called inliers, and are used when you recalculate a solve instead of starting from scratch.
Refinement			
Refine Solve	refineSolve	N/A	Click to attempt to refine the solve calculation using the methods outlined in the **Focal Length**, **Position**, and **Rotation** controls.
Focal Length	refineOptions	off	When enabled, clicking **Refine Solve** causes CameraTracker to finess the solve calculation using an updated **Focal Length**.
Position	refineOptions	off	When enabled, clicking **Refine Solve** causes CameraTracker to finess the solve calculation using an updated camera position.
Rotation	refineOptions	off	When enabled, clicking **Refine Solve** 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	Sets the principal view where features are tracked and the **Mask** input is applied. The secondary camera is calculated relative to this **Principal View** camera. This control also appears on the **CameraTracker** tab. **Note:** Principal View 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).
Camera Motion	cameraMotion	Free Camera	Sets the type of camera motion to compensate for: • **Rotation Only** - select this if the camera is

Control (UI)	Knob (Scripting)	Default Value	Function
			stationary, but rotating. • **Free Camera** - select this if the camera is moving freely, rotating, and translating. • **Linear Motion** - select this if the camera motion is a straight, linear path. • **Planar Motion** - select this if the camera has a flat path, moving in a two-dimensional plane only.
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 **Set reference frame** 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 **Project Settings**, 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	Sets a known interaxial distance for stereo views to define the scene scale. 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).
Constant Interaxial Covergence	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	When enabled, cone shaped 3D markers are displayed on your points in the 3D Viewer. **Note:** When **Show 3D marker** is enabled, set the size of the markers using the scale controls.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the scene is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the scene is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the scene is snapped to a new position, orientation, and size depending on the points selected.
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 **Ctrl/Cmd** and dragging in the 3D Viewer.
scale xyz	scale	0,0,0	Scales the scene around the x, y, and z axes. You can adjust scale values by holding down **Ctrl/Cmd**+**Shift** and dragging in the 3D Viewer. **Note:** This control is only displayed if you've scaled the scene on individual axes.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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]	world_matrix	N/A	Displays the world or absolute xyz transform

Control (UI)	Knob (Scripting)	Default Value	Function
			of the node in world coordinates. **Note:** You can't adjust the **World matrix** manually.
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: • **No Lens Distortion** - treats the footage as having no distortion. Use this option if the **Source** footage has already been corrected to remove lens distortion. • **Unknown Lens** - calculates the lens distortion automatically from the sequence (in the same way as the Image **Analysis** tab in the LensDistortion node) and then refines the distortion in the camera solve.

Control (UI)	Knob (Scripting)	Default Value	Function
Lens Type	lensType	Spherical	Sets the lens type that CameraTracker should expect: **Spherical** or **Anamorphic**.
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 **Lens Type** is set to **Anamorphic**, defines anamorphic squeeze - the distortion in x is scaled by this amount.
Asymmetry Distortion xy	asymmetricDistortion	0,0	When **Lens Type** is set to **Anamorphic**, defines asymmetric distortion to correct for slight misalignments between multiple elements in the lens.
Undistort Input	undistort	off	When enabled, the **Source** is undistorted based on the calculated lens.
filter	filter	Cubic	When **Undistort Input** 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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the

Control (UI)	Knob (Scripting)	Default Value	Function
			curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moiré patterns).
Card Parameters			
scale xyz	cardScale	1,1,1	Equivalent value for the **scale** parameter on the Card node, used to produce horizontal scale in conjunction with the **Radial Distortion** controls.
a (r^3)	a	0	Equivalent value for the **a (r^3)** control on **LensDistortion** tab of the Card node. Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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. Positive values make the card rounder, negative make the corners sharper.

Control (UI)	Knob (Scripting)	Default Value	Function
b (r^2)	b	0	Equivalent value for the **b (r^2)** control on **LensDistortion** tab of the Card node. Defines a square term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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. Positive values make the card rounder, negative make the corners sharper.
c (r^1)	c	0	Equivalent value for the **c (r^1)** control on **LensDistortion** tab of the Card node. Defines a linear term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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 Positive values make the card rounder, negative make the corners sharper.

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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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 **imageaspect** 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 **lens-in focal** distance and l**ens-in haperture** 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 **z** 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 **z** it fills this field of view.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the card is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the card is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the card 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 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 **Ctrl**/**Cmd** 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
			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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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	disabled	When enabled, the distortion is limited to the width - vertical distortion is locked.
a (r^3)	lens_in_ distort_a	0	Defines a cubic term that affects the radial distortion of the texture applied to the card, and the edges of the card. 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.
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. 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. 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 **distortion** parameter on the card.
Deform Tab			
type	type	none	Select the deform type from the dropdown menu: • **none** - the card is not deformed. • **bilinear** - the card is deformed using handles and the **bilinear** controls. • **bicubic** - the card is deformed using handles, tangents, and the **bicubic** controls.
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 **break tangents** 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
			Note: This control has no effect when **type** is set to **bilinear**.
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 **new shape**.
	y_points	3	
new shape	new_shape	N/A	Click to apply the current **x/y points** 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 **x points** -1.
y subdivide	y_subdivide	N/A	Subdivides the control points on the y axis creating new points equal to **y points** -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 **uv position**. 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	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 **xyz** coordinates. • The left and right arrows change the column index of the control point. • The up and down arrows change the row index of the control point.
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 **new shape**.
	y_points	3	
new shape	new_shape	N/A	Click to apply the current **x/y points** 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 **x points** -1.
y subdivide	y_subdivide	N/A	Subdivides the control points on the y axis creating new points equal to **y points** -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 **uv position**. 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 **new shape**.

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	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 **xyz** values corresponding to the position, right tangent, left tangent, up tangent, and down tangent - tangent values are relative to the position value. • The left and right arrows change the column index of the control point. • The up and down arrows change the row index of the control point. **Note:** 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.

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	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. • **off** - hide the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
[crossover curves]	crossover	N/A	From the curve list on the left, select the curve you want to modify. For example, you'd select **z** to only modify the vertex z

Control (UI)	Knob (Scripting)	Default Value	Function
			values. You can also select **y->x**, 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, **Ctrl**/**Cmd**+**Alt**+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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's

Control (UI)	Knob (Scripting)	Default Value	Function
			geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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	When enabled, the vertices that describe the separate cube faces do not share UV coordinate information. Disable this control when you want to guarantee that the edges of connected faces share vertices.
cube	cube	-0.5, 0.5	Specifies the dimensions of the cube (from a positive z axis viewpoint): • **x** - controls the left face on the x axis. • **y** - controls the bottom face on the y axis. • **n** - controls the back face on the z axis. • **r** - controls the right face on the x axis. • **t** - controls the top face on the y axis. • **f** - controls the front face on the z axis.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the object is snapped to a new position, orientation, and size depending on the points selected.

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 **Ctrl**/**Cmd** 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, 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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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,

Control (UI)	Knob (Scripting)	Default Value	Function
			rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid

Control (UI)	Knob (Scripting)	Default Value	Function
			color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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	Sets the extent to which the input image wraps around the cylinder without extrapolating from the image edges. 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.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the

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 **Ctrl**/**Cmd** 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, 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.

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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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	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). Depth can only be calculated where the real world 3D position of

Connection Type	Connection Name	Function
		objects doesn't change. If there are moving objects in your **Source** 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 **Ignore Mask** in the DepthGenerator properties to the channel that contains the matte. The **Mask** input only appears once you've connected the other two inputs.
	Camera	A tracked Camera that matches the Source footage. If necessary, you can create one using the CameraTracker 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	Sets the mask type to exclude areas of the **Source** footage during depth calculation. DepthGenerator expects values of either 0 (for regions to use) or 1 (for regions to ignore). Depth can only be calculated where the real world 3D position does not change. If your **Source** footage includes moving foreground objects, it's a good idea to supply a mask to prevent distortion in moving regions: • **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the **Source** clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the **Source** clip to define which areas to ignore. • **Mask Luminance** - use the luminance of the **Mask** input to define which areas to ignore.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Mask Inverted Luminance** - use the inverted luminance of the **Mask** input to define which areas to ignore. • **Mask Alpha** - use the **Mask** input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted **Mask** input alpha channel to define which areas to ignore. Alternatively, you can try using a smaller **Frame Separation** to capture moving objects.
Output			
Depth Output	outputType	Depth (1/Z)	Sets the type of output produced: • **Depth 1/Z** - output 1/Z where Z is the distance along the camera Z axis. This matches the depth output of the ScanlineRender node. • **Distance** - output the distance along the ray from the camera center to the 3D surface point.
Create Card	createCard	N/A	Click to create a group containing a displaced Card to visualize depth as a surface in 3D space. **Note:** The **DepthOutput** control must be set to **Depth (1/Z)**.
Surface Point	P_channel	none	Sets the channel(s) to output depth as a position pass. The position pass includes the X, Y, and Z coordinates for each pixel in the image. You can use it with the

Control (UI)	Knob (Scripting)	Default Value	Function
			Relight node, or with the PositionToPoints node to visualize depth as a 3D point cloud.
Surface Normal	N_channel	none	Sets the channel(s) to output depth as a normals pass. Use the **NormalDetail** control to affect the smoothness of the normals pass. 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 Relight node.
Frame Separation			
Analyze Sequence	analyzeSequence	N/A	Click to automatically calculate the **FrameSeparation** to use in the sequence. For this to work, the camera in the **Camera** input must be defined for all frames within the frame range. **Note:** If you analyze the sequence and only then decide to add an ignore mask, you should analyze the sequence again after adding the mask.
Analyze Frame	analyzeFrame	N/A	Click to calculate the **Frame Separation** to use at the playhead frame. This gives you more control than **Analyze Sequence**, as you can work through the timeline, analyze particular frames, and if necessary tweak the **Frame Separation** value manually. The camera in the **Camera** input must be defined for all frames within the frame range.
Frame	frameSeparation	1	Adjusts the offset between the current frame and the

Control (UI)	Knob (Scripting)	Default Value	Function
Separation			frame against which to calculate depth for your input. Use a small separation value for fast camera moves and a larger value for slow camera moves. 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. Animate the **FrameSeparation** to compensate for variable camera speeds. The camera in the **Camera** input must be defined for all frames within the frame range. **Note:** The **Analyse Sequence** and **Analyse Frame** buttons attempt to calculate the best separation.
Calculated Accuracy	accuracy	N/A	Displays the depth accuracy calculated when analyzing frame separation. Values closer to 1 are considered accurate, and values closer to 0 inaccurate. Use frames with a high accuracy when placing elements in 3D (for example, by clicking **Create Card** or using a PositionToPoints node). If you're not getting accurate depth values, try adjusting **Frame Separation** or using an **Ignore Mask.**
Depth Generation			
Depth Detail	vectorDetail	0.5	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

Control (UI)	Knob (Scripting)	Default Value	Function
			values pick up finer details, but also increase processing time.
Normal Detail	normalDetail	0.25	Adjusts the resolution of the surface normals. Reduce the detail to smooth out the normals pass. The default value of 0.25 causes the normals pass to be calculated at a quarter resolution.
Noise	noiseLevel	0.01	Sets the amount of noise to ignore in the input footage when calculating the depth map. Try increasing this to smooth depth in flat image regions.
Strength	strength	1	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. In most cases, you can leave this at the default value.
Sharpness	sharpness	0.5	Defines how distinct object boundaries should be. Increase sharpness to separate objects and reduce it to smooth depth.
Smoothness	smoothness	0.5	Adjusts the smoothness weighting of the disparity calculation. Rather than affecting the depth calculation, this applies an intelligent blur on the result. 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.
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 point cloud is taken from.
	norm	The image containing normals data. Note that this input takes the place of the channels specified in the **surface normal** control.

Control (UI)	Knob (Scripting)	Default Value	Function
User Tab			

Control (UI)	Knob (Scripting)	Default Value	Function
display	display	solid	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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

Control (UI)	Knob (Scripting)	Default Value	Function
			to 1/z.
surface normal	N_channel	none	The point normals are taken from these channels in the first input. If the **norm** 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

Control (UI)	Knob (Scripting)	Default Value	Function
			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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Diffuse Tab			
channels	channels	rgba	The effect is only applied to these channels. 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 **Ctrl**/**Cmd** 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, 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.

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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Shadows Tab			
cast shadows	cast_shadows	disabled	When enabled, the light casts shadows as defined by the **Shadow** controls.
shadow mode	shadow_mode	solid	Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity: • **solid** - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender. • **clipped alpha** - 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. • **full alpha** - shadows are calculated based on how light is reduced when it passes through non-opaque

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 **shadow mode** uses when it's set to **clipped alpha** or **full alpha**.
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 shadow. Increasing this value can reduce self-shadowing artifacts. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **full alpha**.
samples	samples	1	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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
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 egde of a shadow. The higher the value, the larger the soft area. This control is only relevant if your shadows are generated using raytracing.
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
			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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
slope bias	depthmap_ slope_ bias	0.01	Bias for the shadow map. This is like **bias**, 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. If increasing **bias** reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring **bias** down a little and increase **slope bias** instead. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
clipping threshold	clipping_ threshold	0.5	Objects that are set to cast shadows are considered transparent if their alpha is below the value set here. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **clipped alpha**.
jitter scale	shadow_jitter_ scale	3	Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger **jitter scale** value results in softer, more perceptually accurate shadows. 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
depthmap resolution	depthmap_ width	1024	Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process. Note that you can also fix crunchy edges by increasing the number of **samples** instead of increasing the depth map resolution. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
output mask	shadow_mask	disabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
		none	Sets the channel you want to output the shadow map into. This can be enabled even if the **cast shadows** 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.

Control (UI)	Knob (Scripting)	Default Value	Function
channels	channels	rgb	The **displace** input's channels to use for the displacement value. If you set this to something other than **all** or **none**, you can use the checkboxes on the right to select individual channels.
source	source	luminance	The source channel you want DisplaceGeo to get a displacement map from. For example, if you selected rgb or rgba from the **channels** dropdown menu, you can use the red, green, or blue channel, or the pixel luminance as the source. • **luminance** - create a displacement map from luminance values. • **red** - create a displacement map from red color values. • **green** - create a displacement map from green color values. • **blue** - create a displacement map from blue color values. • **alpha** - create a displacement map from the alpha channel values. • **rgb absolute** - move your geometry object's vertices to the values in rgb. • **rgb relative** - move your geometry object's vertices on the x, y and z axes by the amounts in rgb.
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 **weight** 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 **offset** fields. For example, if you enter

Control (UI)	Knob (Scripting)	Default Value	Function
			0.5 in the **offset y** 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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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. • **Cf** - surface color • **N** - normal • **PW** - world-space point • **uv** - texture coordinates • **vel** - point velocity.
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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Displacement Tab			
displacement channel	displacement_ channel	luminance	Choose the channel from the **displacement** input that you want to use as the displacement map: • **red** - use the red channel. • **green** - use the green channel. • **blue** - use the blue channel. • **alpha** - use the alpha channel. • **luminance** - use the luminance. • **average** - use the average of the red, green, and blue channels.
normal expansion	normal_ expansion	none	If you're using the **normals** input, uncheck the **build normals** box and choose how you want the normals to be calculated: • **none** - to use the normals as they are (XYZ). • **XY** - to multiply the normals in the x and y dimensions (2*XY-1). • **XYZ** - to multiply the normals in the x, y, and z dimensions (2*XYZ-1).
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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
build normals	build_normals	enabled	Check this to automatically calculate the normals after the displacement. Uncheck this to have the normals calculated from the **normals** input according to the **normals expansion**

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	Select the polygon subdivision mode: • **uniform** - uniform polygon tessellation. • **screen** - evaluates dependent tessellation and ensures that no new triangles are generated once a certain screen size is reached. • **adaptive** - tessellate according to the displaced geometry complexity.
pixel edge length	displacement__ edge_length	20	Sets the length, in pixels, of the subdivision polygon edges. No polygons are generated beyond this threshold.
edge threshold	displacement_ edge_threshold	0.01	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. **Note:** The displacement **mode** must be set to **adaptive** to enable this control.
normal threshold	displacement_ normal_ threshold	0.9	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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: The displacement **mode** must be set to **adaptive** to enable this control.
displace threshold	displacement_ displace_ threshold	0.01	Sets the displace threshold when detecting changes in the height of the displaced samples. The smaller the threshold, the higher the amount of tessellation. **Note:** The displacement **mode** must be set to **adaptive** 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 MergeGeo node here.

Control (UI)	Knob (Scripting)	Default Value	Function
EditGeo 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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.

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 **display** selection, but has the same settings.
axis alignment	axis_align	object	Sets how the current selection's axis is aligned in the Viewer: • **object** - 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. • **average normal** - 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.
	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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation parameters that you've applied to the input object as a channel file.

Control (UI)	Knob (Scripting)	Default Value	Function
			This is a useful method of sharing setups between artists.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 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 **Ctrl**/**Cmd** 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
			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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Emission Tab			
channels	channels	rgba	The effect is only applied to these channels. 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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y

Control (UI)	Knob (Scripting)	Default Value	Function
			portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
mirror image	mirror	enabled	Mirror the HDR image attached to the **map** input.
blur size	blur_size	1	Sets the blur size of the HDR image attached to the **map** input.
display	display	wireframe	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.

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. 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** 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	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. If you've worked with other 3D applications, you may know the Axis node as a "null" or "locator" object.
	look	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 **look** input is moved.

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 **Light** tab. Enable **read from file** if you want to read in light information from an .fbx file using the **File** tab.
light type	light_type	point	Sets the light type to **point**, **directional**, or **spot** 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	Sets the spot light cone angle adjusting the spread of the light. Valid angles are from 0 to 180 degrees. **Note:** This control is only enabled for **spot** lights.
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. **Note:** This control is only enabled for **spot** lights and does not affect the Viewer. Results are only visible on rendered objects.
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 **Note:** This control is only enabled for **spot** lights and is not affected by **falloff type**.

Control (UI)	Knob (Scripting)	Default Value	Function
falloff type	falloff_type	No falloff	Sets the amount of light the object gets from the light source, based on the distance between the light source and the object. • **No falloff** - light does not diminish with distance. • **Linear** - diminish the light at a fixed rate as it travels from the object. • **Quadratic** and **Cubic** - diminish the light at an exponential rate. **Note:** This control is only enabled for **point** and **spot** lights.
display	display	wireframe	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 **Ctrl/Cmd** 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
			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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Shadows Tab			
cast shadows	cast_shadows	disabled	When enabled, the light casts shadow as defined by the **Shadow** controls. If using a ScanlineRender node, this only applies if the **light type** control was set to **directional** or **spot**. Casting shadows from a **point** light type is not supported in the ScanlineRender node.

Control (UI)	Knob (Scripting)	Default Value	Function
shadow mode	shadow_ mode	solid	Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity: • **solid** - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender. • **clipped alpha** - 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. • **full alpha** - 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.
filter	filter	cubic	Determines the type of filter that the **shadow mode** uses when it's set to **clipped alpha** or **full alpha**.
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 shadow. Increasing this value can reduce self-shadowing artifacts. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **full alpha**.
samples	samples	1	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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
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 egde of

Control (UI)	Knob (Scripting)	Default Value	Function
			a shadow. The higher the value, the larger the soft area. This control is only relevant if your shadows are generated using raytracing.
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. 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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
slope bias	depthmap_ slope_bias	0.01	Bias for the shadow map. This is like **bias**, 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. If increasing **bias** reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring **bias** down a little and increase **slope bias** instead. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
clipping threshold	clipping_ threshold	0.5	Objects that are set to cast shadows are considered transparent if their alpha is below the value set here. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **clipped alpha**.
jitter scale	shadow_jitter_ scale	3	Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger **jitter scale** value results in softer, more perceptually accurate

Control (UI)	Knob (Scripting)	Default Value	Function
			shadows. 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. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
depthmap resolution	depthmap_ width	1024	Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process. Note that you can also fix crunchy edges by increasing the number of **samples** instead of increasing the depth map resolution. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
output mask	shadow_mask	disabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
		none	Sets the channel you want to output the shadow map into. This can be enabled even if the **cast shadows** 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 **Light** tab. Enable **read from file** if you want to read in light information from an .fbx file using the **File** 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	When the **file** path is pointing to a valid **.usd** file, the **USD Options** are displayed. The **USD Options** show a scenegraph containing a list of the item names and their paths inside the **.usd** file. Click an item to select it and load it into the scene. The selected item can be identified in the **Load** column. Items in the **.usd** file that weren't originally loaded can still be viewed in scenegraph and loaded into the scene. **Note:** For more information about importing Lights from a **.usd** file, see Importing USD Items.
animation stack name	fbx_take_name	N/A	When the **file** control is pointing to a valid .fbx file, select the required **take name** from the dropdown menu.
node name	fbx_node_name	N/A	When the **file** control is pointing to a valid .fbx file, select the required **node name** from the dropdown menu.
frame rate	frame_rate	24	When **use frame rate** 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 **frame rate** 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 **look** 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 **look**

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 **look** 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 **look** 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 **look** 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** 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	When **swap** is disabled, the vertex values are calculated as follows: $v_x = v_x^{\log_x}$ $v_y = v_y^{\log_y}$ $v_z = v_z^{\log_z}$

Control (UI)	Knob (Scripting)	Default Value	Function
			In the above, v_x refers to the x coordinate of vertex v and log_x refers to the x value entered into the **log** field. When **swap** is checked, the values are calculated like this: $v_x = log_x{}^{v}{}_{x} - 1.0$ $v_y = log_y{}^{v}{}_{y} - 1.0$ $v_z = log_z{}^{v}{}_{z} - 1.0$
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 **swap**.

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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
LUT curves	lut	N/A	Selects the curve you want to modify. Choose **X**, **Y** or **Z**. For example, you'd select Z to only modify the vertex z values. Adjust the curve as necessary by dragging. To insert points on the curve, **Ctrl**/**Cmd**+**Alt**+click on the curve.
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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 merged objects will render. This control is independent from the **display** selection, but has the same settings.
shadow	shadow_ override	unchanged	Determines whether merged geometry nodes remain **unchanged**, or are adjusted to **override inputs**. 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 **override inputs**, **cast shadow** enables the geometry to cast shadows on other objects.
receive shadow	receive_ shadow	disabled	If the shadows operation is set to **override inputs**, **receive shadow** 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	The effect is only applied to these channels. You can use the checkboxes on the right to select individual channels.
operation	operation	over	Selects how you want to composite the results of the two shader nodes together: • **none** - only use input B in the composite. • **replace** - only use input A in the composite. • **over** - composite input A over input B using a mask. • **stencil** - use input B outside the mask area. • **mask** - use input B inside the mask area. • **plus** - add input B to input A. • **max** - use input A if it is greater than input B, otherwise use input B. • **min** - use input A if it is less than input B, otherwise use input B.

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	3D geometry to use as a reference when positioning new shapes. For example, you can use the PointCloudGenerator 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.
	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	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. • **off** - hides the 3D shape. • **wireframe** - displays only the outlines of the shape's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the shape's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.

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 **display** 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. To rename shapes or groups, click on them and enter a new name. 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. 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. There are no specific units for the **Distance** 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	Sets the texture method to use: • **current frame** - Project the current frame onto the shape. • **locked frame** - 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. • **frame difference** - 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. **Note:** This control only has an effect when **display** is set to **textured** or **textured+wireframe**.
	textureFrame	N/A	When **Projected** is set to **locked frame**, ModelBuilder always projects the texture from this frame onto the model. When **Projected** is set to **frame difference**, ModelBuilder subtracts this value from the current frame and projects the resulting frame on to the model.
Preview	previewTexture	tex input	Sets whether to display the image connected to the **tex** input in the UV preview window and on the 3D model: • **off** - Do not display the image in the UV preview or on the 3D model.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **tex input** - 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 **tex** image and see how well the UVs work on the actual model.
Export			
[bake menu]	bakeMenu	Selected geometry	Sets what ModelBuilder creates when you click the **Bake** button: • **Selected geometry** - 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 **Projection**. • **Projection** - ModelBuilder creates a projection at the current texture frame. This creates a Project3D node with a FrameHold node set to lock the input image and camera to the texture frame. You can then use the ApplyMaterial node to apply the projection to geometry created by baking **Selected geometry**. **Note:** 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 online help.
Bake	bake	N/A	Bakes out a feature of your model. You can choose the feature using the bake menu. This allows you to separate out parts of the scene for easier processing.
Show Source	srcDisplay	enabled	When enabled, the **src** image is displayed in the

Control (UI)	Knob (Scripting)	Default Value	Function
Image			3D Viewer whenever the Viewer is locked to the input camera. When disabled, the **src** image is not displayed in the 3D Viewer.
Pass Through Geo	passThroughGeo	enabled	When enabled, the geometry from the **geo** input appears both in the Viewer and renders. This can be useful when you want to use the **geo** 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. When disabled, ModelBuilder doesn't output the geometry from the **geo** input.
Shape Defaults Tab			
Point			
Create	createPoint	N/A	Creates a new point in the scene. You can use points to define locators on different parts of the scene. This is the same as selecting **Point** from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.
Card			
Create	createCard	N/A	Creates a new card in the scene. This is the same as selecting **Card** from the shape creation menu in the ModelBuilder toolbar on the left hand side of the Viewer.
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. This is the same as selecting **Cube** 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. This is the same as selecting **Sphere** 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. This is the same as selecting **Cone** 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. This is the same as selecting **Cylinder** 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: • **object** - RIB statements are inserted before the statements for the object connected to the input. • **shader** - RIB statements replace all of the shader

Control (UI)	Knob (Scripting)	Default Value	Function
			definitions for the object connected to the input. • **replace** - RIB statements completely replace the object connected to the input. A transform can then be applied to the RIB statements. Setting the operation to **replace** enables the transform knobs. • **world** - RIB statements are inserted at the start of the world in the RIB stream.
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	The RIB statements to add to the scene. **Note:** 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.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
	snap_menu	N/A	• **Snapto** - snap your 3D object to a vertex selection. • **Scaleto** - scale your 3D object to a vertex selection. • **Translateto** - translate your 3D object to a vertex selection.
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 **Ctrl/Cmd** 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 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. You can also hold down **Ctrl/Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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 **action** to **lookat**, the node points all normals towards this input. (optional)

Control (UI)	Knob (Scripting)	Default Value	Function
Normals Tab			
display	display	unchanged	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. • **off** - doesn't display geometry outlines. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
action	action	unchanged	Sets the mode for manipulating normals: • **unchanged** - makes no changes to the object's normals. • **set** - assigns the normals' values to the normal **x**, **y**, and **z** fields. • **build** - rebuilds each normal based on the surrounding vertices. Adjust the **thresholdangle** 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. • **lookat** - points all normals at the object connected to

Control (UI)	Knob (Scripting)	Default Value	Function
			the **lookat** input. The **normal** control's values ares added to the lookat position. • **delete** - removes the named attribute from the object. For example, if you remove the N attribute, the object has no normals. See the **attribname** control below.
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 **set** and **lookataction** 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 **build** is selected in the **action** dropdown. Broken normals create sharp edges when lit.
attrib name	N_attrib_ name	N	The name of the normal attribute to delete (this only works if you set **action** to **delete**). 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. • **Cf** - surface color • **N** - normal • **PW** - world-space point • **uv** - texture coordinates • **vel** - point velocity.

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 **min shininess**. Where the mask is white, the shininess is set to **max shininess**. 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 **specular** 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 **emission** 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 **diffuse** are limited to the non-black areas of the mask.
	unnamed	Either: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Phong Tab			
channels	channels	rgba	The effect is only applied to these channels. If you set this to something other than **none**, 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	The shininess value controls the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** 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 **min shininess**. Where the matte is white, the shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly. If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
max shininess	max_shininess	10	The shininess value controls the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** 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 **min shininess**. Where the matte is white, the

Control (UI)	Knob (Scripting)	Default Value	Function
			shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly. If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
shininess channel	shininess_ channel	luminance	Select which channel from the **mapSh** input is used to map the black and white values to the **minshininess** and **maxshininess** controls. Choose: • **red** to use the red channel for the mapping, • **green** to use the green channel, • **blue** to use the blue channel, • **alpha** to use the alpha channel, • **luminance** to use the luminance, or • **averagergb** to use the average of the red, green, and blue channels.

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	Sets the amount of light the object gets from the light source, based on the distance between the light source and the object. • **No falloff** - light does not diminish with distance. • **Linear** - diminish the light at a fixed rate as it travels from the object. • **Quadratic** and **Cubic** - diminish the light at an exponential rate.
display	display	wireframe	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			shot. You can create and export them using Nuke or 3D tracking software, such as 3D-Equalizer, Maya, or Boujou. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 **Ctrl**/**Cmd** 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
			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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Projection Tab (Controls on this tab do not affect Viewer output. Projection only applies to rendered objects.)			
projection	projection_ mode	perspective	Sets the projection type for the Point light on rendered objects: • **perspective** - objects in front of the light have the illusion of depth defined by the **focal length** and **h/vaperture**.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **orthographic** - objects are viewed using a parallel projection. • **uv** - every object renders its UV space into the output format. Use this to cook out texture maps. • **spherical** - the entire 360° world is rendered as a spherical map.
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 **Shadow** controls. However, casting shadows from a Point light type is not currently supported in the ScanlineRender node.
shadow mode	shadow_mode	solid	Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity: • **solid** - objects that cast shadows are considered to be

Control (UI)	Knob (Scripting)	Default Value	Function
			completely solid. This option can be used with both ScanlineRender and PrmanRender. • **clipped alpha** - 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. • **full alpha** - 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.
filter	filter	cubic	Determines the type of filter that the **shadow mode** uses when it's set to **clipped alpha** or **full alpha**.
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 shadow. Increasing this value can reduce self-shadowing artifacts. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **full alpha**.
samples	samples	1	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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
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 egde of a shadow. The higher the value, the larger the soft area. This control is only relevant if your shadows are generated using raytracing.

Control (UI)	Knob (Scripting)	Default Value	Function
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. 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. This control is only relevant when **shadow mode** is set to **solid** or **clipped alpha**.
slope bias	depthmap_ slope_ bias	0.01	Bias for the shadow map. This is like **bias**, 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. If increasing **bias** reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring **bias** down a little and increase **slope bias** instead. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
clipping threshold	clipping_ threshold	0.5	Objects that are set to cast shadows are considered transparent if their alpha is below the value set here. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **clipped alpha**.
jitter scale	shadow_jitter_ scale	3	Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger **jitter scale** value results in softer, more perceptually accurate shadows. PCF works by sampling the depth map at many different positions around the same spot. The final shadow value

Control (UI)	Knob (Scripting)	Default Value	Function
			for that spot is an average of how many of the samples were occluded or visible from point of view of the light. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
depthmap resolution	depthmap_ width	1024	Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process. Note that you can also fix crunchy edges by increasing the number of **samples** instead of increasing the depth map resolution. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
output mask	shadow_mask	disabled	Enables the associated channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
		none	Sets the channel you want to output the shadow map into. This can be enabled even if the **cast shadows** 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	An optional image to use as a mask. By default, the point cloud 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 **mask** control is disabled or set to **none**.
	Source	The source footage from which the camera information was obtained.

Control (UI)	Knob (Scripting)	Default Value	Function
PointCloudGenerator Tab			
display	display	solid	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. • **off** - hides the points. • **wireframe** - displays only the outlines of the points. • **solid** - displays all points with a solid color. • **solid+wireframe** - displays points as solid color and includes their vertices. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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	Sets the principal view where tracks are analyzed and the **Mask** input is applied. The secondary camera is calculated relative to this **Principal View** camera. 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).
Ignore Mask	ignore	None	Set the mask type to exclude areas of the sequence during generation: • **None** - none of the footage is ignored. • **Source Alpha** - use the alpha channel of the source clip to define which areas to ignore. • **Source Inverted Alpha** - use the inverted alpha channel of the source clip to define which areas to ignore. • **Mask Luminance** - use the luminance of the **Mask** input to define which areas to ignore. • **Mask Inverted Luminance** - use the inverted luminance of the **Mask** input to define which areas to ignore. • **Mask Alpha** - use the **Mask** input alpha channel to define which areas to ignore. • **Mask Inverted Alpha** - use the inverted **Mask** input alpha channel to define which areas to ignore.
Set Keyframes			
Analyze	analyzeSequence	N/A	Click to automatically analyse the sequence and set

Control (UI)	Knob (Scripting)	Default Value	Function
Sequence			the required keyframes to use when generating the point cloud. **Note:** Keyframes are selected to provide a large enough camera baseline to triangulate points, but you can add and delete keyframes manually, if necessary.
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 **Add All**. 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 **FrameSpacing** 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	Displays the depth accuracy calculated at the current frame when using the automatic **SetKeyframes** method. The accuracy rating can help you to select frame ranges when generating a point cloud - higher accuracy frames produce cleaner point clouds.
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	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. Points can also be added to the point cloud in stages using different frame range selections. Use **CalculatedAccuracy** to determine the most accurate frames for generation.
Clear Points	clearPoints	N/A	Click to clear all tracked points.
Post Filtering			
Display rejected points	displayRejectedPoints	enabled	When enabled, points that fall outside the **Angle** and **DensityThresholds** are highlighted in the 3D Viewer. When disabled, all rejected points are removed from the Viewer.
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 retain the more accurate points. 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 **Angle** and **DensityThresholds**.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: To clean up the point cloud, try enabling **Output points per frame** and **Display rejected points**. You can then tune the **Filtering** 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	When enabled, only the points generated at the current frame are displayed in the Viewer. When disabled, points from all tracked frames are displayed.
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	When enabled, only points designated as part of a group on the **Groups** tab are displayed in the 3D Viewer. You can label the point cloud using **Groups** to help 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. To delete points use **Vertex selection** mode in the 3D Viewer and press the **delete** key.

Control (UI)	Knob (Scripting)	Default Value	Function
Groups			
groups	groups	None	Lists all groups in the point cloud and allows you to set the **name**, **color**, and **visibility** of each group. To create groups, enable **Vertexselection** 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. 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 http://www.cs.jhu.edu/~misha/Code/PoissonRecon/.
Samples	samplesPerNode	1	Specifies the minimum number of sample points used to calculate mesh points, using floating point values. 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.
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	Sets the maximum depth of the calculation tree that is used for surface reconstruction. You can also think of it as the density of the voxels (volumetric pixel) used by the solver. Running at depth **d** corresponds to solving on a voxel grid whose resolution is no larger than 2^d x 2^d x 2^d. Note that since the reconstructor dynamically adapts the octree, the specified reconstruction depth is only an upper bound. **Note:** 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.
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 **Depth** 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 **Depth** 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. • For noise-free samples, small values in the range [1.0 - 5.0] are acceptable. • For more noisy samples, larger values in the range [15.0 - 20.0] may be needed to provide a smoother, noise-reduced reconstruction.
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 **pos** input is connected.

Control (UI)	Knob (Scripting)	Default Value	Function
PositionToPoints Tab			
display	display	solid	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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 **pos** 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 **norm** 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: • A Scene node that is connected to the objects and lights you want to render, or • a 3D object or MergeGeo node.
	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 **root.format** or **root.proxy_format** defined in the **Project Settings**.

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 Light node's **Shadows** tab.
reflections	reflections	disabled	When enabled, add reflections to your render. You can adjust the parameters for your reflections using the Reflection node's **Properties** panel.
refractions	refractions	disabled	When enabled, add refractions to your render. You can adjust the parameters for your refractions using the Refraction node's **Properties** 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
			• **perspective** - objects in front of the camera have the illusion of depth defined by the camera's focal-length and aperture. • **orthographic** - objects are viewed using parallel projection. • **render camera** - take the projection mode from the camera input.
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	Sets the number of samples to render per pixel. Having more samples increases your render quality, but also increases render time. **Note:** Setting this value to 1 turns antialiasing off.
shading rate	shading_rate	0.5	Sets the number of shading calculations for primitives. For example, a shading rate of 1.0 specifies one shading sample per pixel. This value, along with **pixel samples**, 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.

Control (UI)	Knob (Scripting)	Default Value	Function
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most.
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	Sets the number of samples to render, per pixel, to produce motion blur. The maximum is 5. 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. If the rendered result shows banding or stepping that looks like too few motion blur samples, first try increasing the 'pixel samples' setting.
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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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. • **custom** - open the shutter at the time you

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 **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.
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: • **None** - instantaneous open and close. • **Linear** - the shutter opens and closes in linear intervals. • **Bezier** - the shutter opens and closes more gradually, according to a Bezier curve.
Shader Tab			
motion vectors	output_motion_ vectors_type	distance	Sets the type of vectors you'd like to render: • **off** - no motion vector information is rendered. • **velocity** - store the velocity of every single pixel in the motion vector channels. • **distance** - for every pixel, store the distance (in pixels) between samples in the motion vector channels.
motion vector channels	MB_channels	forward	When **motion vectors** is set to anything other than **off**, 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 **output vectors** is enabled, the shader vector surface points are written to this channel or channels.
surface normal	N_channel	none	When **output vectors** is enabled, the shader vector surface normals are written to this channel or channels.
RIB Tab			
filter	ribFilter	disabled	When enabled, filter the scene information generated by Nuke for RenderMan. Nuke then calls a Python function called **nukescripts.renderman.filterRIB**. **Note:** Filtering can make the render start up slightly slower as a temporary RIB file is created for each render.
arguments	filterArgs	none	When **filter** 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. For example, set the filter arguments to **-rif myfilter.so** to load your own RI filter.
ouput			
file	file	none	Sets the RIB dump file path and name.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: For multiple frames use the #### pattern.
Execute	Execute	N/A	Click to dump RIB files for a given sequence the path specified in the **file** control. **Note:** You can execute from the command line using the **-X nodeName** switch.
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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
ProceduralNoise Method	mode	Turbulence	Choose the type of noise to use: • **fBm** (fractional Brownian motion) runs noise() "octave" times at different scales to get random numbers between -1 and +1 and adds them up. • **turbulence** is the same as **fBm** except it uses the absolute value of the noise function so the values it sums up are all between 0 and 1.
Orientation	orient	Z	Select the values to modify: • **X** - only modify the values on the x axis. • **Y** - only modify the values on the y axis. • **Z** - only modify the values on the z axis. • **All** - modify the values on the x, y, and z axes.
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 **front** facing, **back** facing, or **both** 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 **crop**.
occlusion mode	occlusion_ mode	disabled	If you want to use raycasting to determine which parts of the object are occluded, check **self** to see the geometry connected to the shader or check **world** 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** 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. 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. 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: • A Scene node that is connected to the objects and lights you want to render, or • a 3D object or MergeGeo node.
	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 **root.format** or **root.proxy_format** defined in the **Project Settings**.

Control (UI)	Knob (Scripting)	Default Value	Function
RayRender Tab			
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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. Lanczos4 provides the least sharpening and Sinc4 the most.
projection mode	projection_mode	render camera	The projection modes are: • **perspective** - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera. • **orthographic** - use orthographic projection (projection onto the projection plane using parallel rays).

Control (UI)	Knob (Scripting)	Default Value	Function
			• **spherical** - 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. • **render camera** - use the projection type of the render camera.
stochastic samples	stochastic_samples	0	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. Stochastic sampling is based on Robert L. Cook's *Stochastic Sampling in Computer Graphics*, available in *ACM Transactions on Graphics*, Volume 6, Number 1, January 1996. **Note:** It is recommended for motion blur that the samples control is adjusted. This also provides anti-aliasing by jittering the sample point.
intersection epsilon	triangle_intersection_epsilon	0.000035	Sets the error threshold for the triangle ray intersection calculations.
MotionBlur Tab			
interpolate animation	interpolate_animation	disabled	When enabled, interpolate between animation keyframes during the **shutter** aperture. When disabled, no interpolation is

Control (UI)	Knob (Scripting)	Default Value	Function
			calculated. Enabling interpolation can decrease the number of keyframes and **stocastic samples** required to produce motion blur, but may introduce deviation from the motion direction.
samples	samples	1	Sets the number of keyframes used to reconstruct motion blur during the **shutter** 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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - close the shutter at the current frame. For example, if you set the

Control (UI)	Knob (Scripting)	Default Value	Function
			shutter value to 1 and your current frame is 30, the shutter stays open from frame 29 to 30. • **custom** - 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.
shutter custom offset	shuttercustomoffset	0	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.
match ScanlineRender shutter offset	use_scanline_shutter	disabled	When enabled, assume a **sample** value of 1 and a **shutter offset** of 0, unless a custom **shutter offset** is in use. When disabled, set the required **sample** value.
AOVs Tab			
output AOV	output_shader_vectors	disabled	When enabled, all the arbitrary output variables specified are passed into the specified channels.
remove AOV from beauty pass	remove_from_beauty	enabled	When enabled, the specified AOV are not included in the output of the node. When disabled, all specified AOV

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 **Camera** tab are enabled, allowing you to scan stereo footage. When disabled, the controls on the **Camera** 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 **Eye Separation**, 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 **Rig Size** 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	Determines how pole merging is handled: • **None** - no IPD adjustment occurs towards the poles. • **Linear** - the views are merged gradually from the **Start Angle** specified toward the pole. Increasing the angle moves the start point toward the poles. • **Cosine** - the views are merged smoothly toward the poles. Reducing the **Separation Falloff** shifts the transition in depth towards the poles.
Start Angle	separationFalloffStartAngle	0	Sets the point at which falloff begins when **Falloff Type** is set to **Linear**. Increasing the value pushes the merge point toward the poles, a value of 90 disables pole merging entirely.
Falloff Exponent	separationFalloffExponent	1	Sets the rate off falloff for the eye separation towards the poles when **Falloff Type** is set to **Cosine**. A value of 1 produces smooth merging toward the poles for the left and right views. Reducing the value pushes the merge

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	When enabled, sample rays with respect to the capture radius for a camera rig. Enable this control to match stereoscopic image stitches generated for a horizontal ring of cameras with a diameter set by the **Rig Size** control.
Rig Size	rigDiameter	0.1	Sets the diameter of the camera rig used to generate a corresponding stereoscopic image stitch, when **Sample Ray From Camera** is enabled. **Note:** The **Rig Size** diameter should always be greater than the **Eye Separation** value.

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 an 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	Enter the file path and file name or use the folder icon to browse to the required location. Reading **.abc** and **.usd** 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 Importing ABC Files or Importing USD Files for more information.
Localization Policy	localizationPolicy	from auto-localize path	Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times: • **on** - the files are cached, regardless of location, as long as the **limit to (GB)** limit is not breached. • **from auto-localize path** - the files are cached if they reside in the **auto-localize from** directory, as long as the **limit to (GB)** limit is not breached. • **on demand** - only localize these source clips when you manually update them. See Nuke's Online Help for more information. • **off** - the files are never cached, regardless of location.

Control (UI)	Knob (Scripting)	Default Value	Function
Update	updateLocalization	N/A	When this ReadGeo node is set to **Localization Policy** > **on demand**, click **Update** 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 **Input**. 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 **Input**. This can be used to display the offset used in the TimeOffset node.
display	display	textured	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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

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 **Ctrl**/**Cmd** 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, 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

ABC

Control (UI)	Knob (Scripting)	Default Value	Function
ABC Options - These controls are only shown if you have imported an **.abc** 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. This should be enabled for animated objects.
sub frame	sub_frame	enabled	When enabled, objects are read on sub frames which can be used to render motion blur. **Tip:** Disable **sub frame** for faster UI interaction.
lock frame	lock_frame	1	When **read on each frame** 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	Determines how point primitives are rendered: • **point clouds** - Render primitives as Nuke point clouds. • **particles** - Render primitives as Nuke particles.
use geometry colors	use_geometry_colors	disabled	When enabled, apply geometry color attributes read from **.abc** files and apply them to the Nuke geometry. **Note:** Disabling **use geometry colors** can cause differences in rendered output when compared to previous versions of Nuke. If this occurs, enable **use geometry colors** in the ReadGeo properties panel.
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
			By default, only meshes imported into this ReadGeo node are shown. To view all meshes that exist in the Alembic file, enable **view entire scenegraph**. The **Load** icons on the left indicate the state of each item in the list: • **A gray dot** - The item isn't loaded into this ReadGeo node or is hidden. • **An orange bar** - 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. Click the **Load** icons to show and hide the selected item and its children.
view entire scenegraph	all_objects	disabled	When disabled, only meshes imported into this ReadGeo node are shown. 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 **select** or **deselect** from the right-click menu. To select or deselect multiple items, press **Ctrl/Cmd** or **Shift** while clicking them.

FBX

Control (UI)	Knob (Scripting)	Default Value	Function
FBX Options - These controls are only shown if you have imported an **.fbx** file.			
animation stack	fbx_take_name	dependent on file	The take you want to use from the **.fbx** 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 **.fbx** file. 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 **use frame rate**.
use frame rate	use_frame_rate	disabled	When enabled, the **frame rate** defined above is used to sample the animation curves. When disabled, the frame rate defined in the **.fbx** file is used to sample the animation curves.
object type	object_type	Mesh	Select the object type: • **Mesh** - Import a single mesh or all the meshes (or NURBS curves/patch surfaces converted to meshes) from the **.fbx** file. • **Point Cloud** - Import a point cloud from the **.fbx** file.
all objects	all_objects	disabled	When enabled, ReadGeo imports all the meshes in the **.fbx** file rather than just one. This overrides whatever you have selected under **node name**.
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. This should be enabled for animated objects.
read transform from file	read_from_file	enabled	When enabled, transform properties are imported from the **.fbx** 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 **.fbx** file to ensure they match the file content. When disabled, you can modify the transform properties imported from the **.fbx** file using the transform controls, and your changes are kept even if the script is reloaded. 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 **.obj** file.			
update mode	update_mode	all	Sets the update mode for the OBJ geometry: • **all** - loads all geometry groups for each frame. • **point-cloud** - loads only point and point attributes group data at each frame. The **primitives frame** control specifies which frame in the sequence contains the primitive and vertex attribute group data.
primitives frame	full_ geometry_ frame	1	When **update mode** is set to **point-cloud**, 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, **w** coordinates are read along with **uv** coordinates, where present. **Tip:** Occasionally, **w** values contain garbage, so you may want to disable this control to use a value of 1 instead.

USD

Control (UI)	Knob (Scripting)	Default Value	Function
USD Options - These controls are only shown if you have imported a **.usd** or **.usda** 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
			Note: read on each frame should be enabled for animated objects.
Scenegraph Tab			
scene view	scene_graph	N/A	Displays all items in the file, including currently unsupported items such as cameras. The **Load** column displays the state of each item in the file: **Note:** Grayed-out items are currently unsupported. • **A gray dot** - The item isn't loaded into this ReadGeo node or is hidden. • **An orange bar** - 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. • **A broken orange bar** - The item is partially loaded, meaning that some children of the item are not loaded. You can show or hide imported items by clicking on the icons in the **Load** column. Alternatively, you can choose **select** or **deselect** from the right-click menu. The **Type** column displays at a glance what the file contains, such as meshes and cameras. **Note:** By default, only items imported into this ReadGeo node are shown. To view all items that exist in the USD file, enable **view entire scenegraph**.

Control (UI)	Knob (Scripting)	Default Value	Function
view entire scenegraph	all_objects	disabled	When disabled, only items imported into this ReadGeo node are shown. 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 **select** or **deselect** from the right-click menu. To select or deselect multiple items, press **Ctrl**/**Cmd** or **Shift** while clicking them.

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	Either: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding

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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding 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 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	The 2D image to relight using 3D lights. This image should contain normal and point position passes. You can create normal and point position passes using the DepthGenerator node in NukeX, for example.
	cam	The camera used to render the **color** image. **Note:** The **cam** input only appears once the **lights** input has been connected to a light or scene node.
	lights	The light node to use to relight the **color** image. If you want to use multiple lights, you can also connect a Scene node here.
	material	The 3D shader to apply to the **color** image. This can be a Phong node, for example. Depending on the type of shader you attach, ensure that you've defined the necessary properties for it. **Note:** The **material** input only appears once the **cam** input has been connected.

Control (UI)	Knob (Scripting)	Default Value	Function
Relight Tab			
use alpha	use_alpha	disabled	When enabled, the alpha channel of the **color** image is used as a mask to limit the effects of Relight on the original scene.
normal	normal	none	The channel from the **color** input that contains the

Control (UI)	Knob (Scripting)	Default Value	Function
vectors			normal pass.
point positions	position	none	The channel from the **color** 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

Note: ScanlineRender's New 3D system equivalent node is also named ScanlineRender. For Classic 3D System scenes, make sure you are adding the Classic 3D System node (found in right click node menu under **3D** > **3D Classic**, not the New one **3D** > **3D**).

Inputs and Controls

Connection Type	Connection Name	Function
Input	obj/scn	Either: • A Scene node that is connected to the objects and lights you want to render, or • a 3D object or MergeGeo node.

Connection Type	Connection Name	Function
	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 background image into the scene and to determine the output resolution. If not used, this defaults to **root.format** or **root.proxy_format** defined in the **ProjectSettings**. 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			
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	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). • **Impulse** - remapped pixels carry their original values. • **Cubic** - remapped pixels receive some smoothing. • **Keys** - remapped pixels receive some smoothing, plus minor sharpening (as shown by

Control (UI)	Knob (Scripting)	Default Value	Function
			the negative -y portions of the curve). • **Simon** - remapped pixels receive some smoothing, plus medium sharpening (as shown by the negative -y portions of the curve). • **Rifman** - remapped pixels receive some smoothing, plus significant sharpening (as shown by the negative -y portions of the curve). • **Mitchell** - remapped pixels receive some smoothing, plus blurring to hide pixelation. • **Parzen** - remapped pixels receive the greatest smoothing of all filters. • **Notch** - remapped pixels receive flat smoothing (which tends to hide moire patterns). • **Lanczos4**, **Lanczos6**, and **Sinc4** - remapped pixels receive sharpening which can be useful for scaling down. **Lanczos4** provides the least sharpening and **Sinc4** the most. • **Nearest** - Fastest and crudest, sample the nearest texel from the appropriate mip map. • **Bilinear** - Remove blockiness, sample and interpolate the four nearest texels from the appropriate mipmap level. • **Trilinear** - Smooth interpolation of texture quality according to the distance, bilinearly interpolate between two closest mipmap levels. • **Anisotropic** - Highest quality filtering, gives a better result when shading surfaces with a high angle relative to the camera.
antialiasing	antialiasing	none	Sets the level of antialiasing to reduce any aliasing artifacts in the render. Choose from **none**, **low**, **medium** and **high**.
Z-blend mode	zblend_mode	none	Type of ramp to use to blend two surfaces within the **Z-blend range** of each other. Smooth looks

Control (UI)	Knob (Scripting)	Default Value	Function
			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	The projection modes are: • **perspective** - have the camera's focal length and aperture define the illusion of depth for the objects in front of the camera. • **orthographic** - use orthographic projection (projection onto the projection plane using parallel rays). • **uv** - have every object render its UV space into the output format. You can use this option to cook out texture maps. • **spherical** - have the entire 360-degree world rendered as a spherical map. You can increase **tessellationmax** to increase the accuracy of object edges as they are warped out of line, but this takes longer to render. • **rendercamera** - use the projection type of the render camera.
tessellation max	max_tessellation	3	Limits recursive subdivision of polygons by a screen-space distance percentage. This control can be useful in the **spherical** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
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.
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 **ScanlineRender** 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	This value controls how the shutter behaves with respect to the current frame value. It has four options: • **centred** - 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. • **start** - 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. • **end** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			from frame 29 to 30. • **custom** - 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.
shuttercustom offset	shuttercustomoffset	0	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.
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 **focal distance** in front of it for each sample to produce depth-of-field effects from multiple samples. **Note:** The **focal distance** is set in the Camera node's controls, in the **Projection** tab.

Control (UI)	Knob (Scripting)	Default Value	Function
stochastic samples	stochastic_samples	0	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. Stochastic sampling is based on Robert L. Cook's *Stochastic Sampling in Computer Graphics*, available in *ACM Transactions on Graphics*, Volume 6, Number 1, January 1996. **Note:** It is recommended for motion blur that the **samples** control is adjusted. This also provides anti-aliasing by jittering the sample point.
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	Select how to render motion vectors: • **off** - do not render motion vectors. • **classic** - render motion vectors the classic (pre-Nuke 6.1) way. This option is only provided for backwards compatibility, and isn't always accurate. • **velocity** - 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 **samples** to 1. • **distance** - for every pixel, store the distance (in pixels) between samples in the motion vector channels. This is the recommended option that

Control (UI)	Knob (Scripting)	Default Value	Function
			usually produces the best results. It also allows the VectorBlur 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. You can use the checkboxes on the right to select individual channels.
output vectors	output_shader_vectors	disabled	When enabled, shader vectors (**surface points** and **surface normals**) 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 **output vectors** 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 **output vectors** 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. 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	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object geometry outlines. • **textured** - displays only the surface textures. • **textured +wireframe** - displays the wireframes plus the surface textures.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **unchanged** - doesn't change object display modes.
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 **display** selection, but has the same settings.
shadow	shadow_ override	unchanged	Determines whether geometry nodes in the scene remain **unchanged**, or are adjusted to **override inputs**. 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 **override inputs**, **cast shadow** enables the geometry to cast shadows on other objects.
receive shadow	receive_ shadow	disabled	If the shadows operation is set to **override inputs**, **receive shadow** 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 **min shininess**. Where the mask is white, the shininess is set to **max shininess**. 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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Specular Tab			
channels	channels	rgba	The effect is only applied to these channels. You can use the checkboxes on the right to select individual channels.
white	white	0.18	The brightness of the specular highlight. The higher the value, the shinier the material seems.
min shininess	min_shininess	10	The shininess value controls the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** 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 **min shininess**. Where the matte is white, the shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly.

Control (UI)	Knob (Scripting)	Default Value	Function
			If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
max shininess	max_shininess	10	The shininess value controls the width of the highlights. The higher the value, the wider the highlights. If you have connected a mask to the **mapSh** 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 **min shininess**. Where the matte is white, the shininess is set to **max shininess**. Values in between (where the matte is gray) are attenuated accordingly. If you're not using the **mapSh** input, the average of **min shininess** and the **maxshininess** value is used as the shininess value for the material.
shininess channel	shininess_ channel	luminance	Select which channel from the **mapSh** input is used to map the black and white values to the **minshininess** and **maxshininess** controls. Choose: • **red** to use the red channel for the mapping, • **green** to use the green channel, • **blue** to use the blue channel, • **alpha** to use the alpha channel, • **luminance** to use the luminance, or • **average rgb** to use the average of the red, green, and blue channels.

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
Sphere Tab			
display	display	textured	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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **Input**. 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 **Input**. 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	Sets the extent to which the input image wraps around the sphere horizontally without extrapolating from the image edges. 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.
v extent	v_extent	180	Sets the extent to which the input image wraps around the sphere vertically without extrapolating from the image edges. 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.
close top	close_top	enabled	When enabled, the top of the sphere is closed off.

Control (UI)	Knob (Scripting)	Default Value	Function
close bottom	close_bottom	enabled	When enabled, the bottom of the sphere is closed off.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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	Sets the amount of light the object gets from the light source, based on the distance between the light source and the object. • **No falloff** - light does not diminish with distance. • **Linear** - diminish the light at a fixed rate as it travels from the object. • **Quadratic** and **Cubic** - diminish the light at an exponential rate.
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
			are for display purposes only in the 3D Viewer. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+lines** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+lines** - displays the wireframe plus the surface texture.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the object is snapped to a new position, orientation, and size depending on the points selected.

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 **Ctrl**/**Cmd** 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, 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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Check **specify matrix** 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. **Note:** Unlike the **Local matrix**, you can't adjust the **World matrix** manually.
Shadows Tab			
cast shadows	cast_shadows	disabled	When enabled, the light casts shadow as defined by the **Shadow** controls.
shadow mode	shadow_mode	solid	Presents three shadow casting modes that affect shadows cast by objects, based on the objects' opacity: • **solid** - objects that cast shadows are considered to be completely solid. This option can be used with both ScanlineRender and PrmanRender. • **clipped alpha** - 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. • **full alpha** - 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.
filter	filter	cubic	Determines the type of filter that the **shadow mode** uses when it's set to **clipped alpha** or **full alpha**.
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
			shadow. Increasing this value can reduce self-shadowing artifacts. This only applies if your shadows are generated using depth mapping and **shadow mode** is set to **full alpha**.
samples	samples	1	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. This only applies when **shadow mode** is set to **solid** or **clipped alpha**.
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 egde of a shadow. The higher the value, the larger the soft area. This control is **only** relevant if your shadows are generated using raytracing.
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. 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. This only applies when **shadow mode** is set to **solid** or **clipped alpha**.
slope bias	depthmap_ slope_ bias	0.001	Bias for the shadow map. This is like **bias**, 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. If increasing **bias** reduced the existing self-shadowing artifacts but introduced more artifacts in other areas of the image, you may want to bring **bias** down a little and

Control (UI)	Knob (Scripting)	Default Value	Function
			increase **slope bias** instead. This only applies if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
clipping threshold	clipping_ threshold	0.5	Objects that are set to cast shadows are considered solid if their alpha is below the value set here. This only applies if your shadows are generated using depth mapping and **shadow mode** is set to **clipped alpha**.
jitter scale	shadow_jitter_ scale	3	Sets the amount of jitter used when doing percentage-closer filtering (PCF) for soft shadows. A larger **jitter scale** value results in softer, more perceptually accurate shadows. 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. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.
depthmap resolution	depthmap_ width	1024	Sets the resolution of the depth map. Larger values will result in a less crunchy edge, but will require more time to process. Note that you can also fix crunchy edges by increasing the number of **samples** instead of increasing the depth map resolution. This control is only relevant if your shadows are generated using depth mapping and **shadow mode** is set to **solid** or **clipped alpha**.

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 **none**.
		none	Sets the channel you want to output the shadow map into. This can be enabled even if the **cast shadows** 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 MergeGeo node here.
	look	An optional input where you can connect a Camera or 3D object that the transformed 3D object should face. If a **look** input exists, the transformed 3D object is automatically rotated to point towards the **look** input whenever the **look** input is moved. This can be useful, for example, if you have a 2D matte painting mapped to a Card in your scene. The **look** 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.
	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. 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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** 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: • **Import chan file** - import a channel file and transform

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the object is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the 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 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 **Ctrl/Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **Specify Matrix** 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.
Look Tab			
Look Axis	look_axis	+Z	The axis around which the 3D object is rotated to face the **look** 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 **look** 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 **look** 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 **look**

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 **look** 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: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Transmission Tab			
transmittance	transmittance	0.18	When **absorption mode** is set to **constant**, 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: • **constant** - uses the **transmittance** control to set the amount of absorption. • **solid** - uses the solid component of the input material to set the amount of absorption. • **diffuse** - uses the diffuse component of the input material to set the amount of absorption. • **map** - uses the **map** input to set the amount of absorption.

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 MergeGeo node here.

Control (UI)	Knob (Scripting)	Default Value	Function
Trilinear 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. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** 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 (**p0-p7**) into a temporary buffer.
paste	paste_shape	N/A	Pastes previously copied positions of the bounding box corners (**p0-p7**).
set key	set_key_shape	N/A	Sets keys for the positions of all the bounding box corners (**p0-p7**) on the current frame. This is the same as selecting **Setkey** 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 (**p0-p7**) on the current frame.
delete anim	del_anim_ shape	N/A	Deletes the keys on the positions of all the bounding box corners (**p0-p7**) on all frames.
p0 xyz	p0	-0.5, -0.5, -0.5	The x, y, and z coordinates for the **p0** 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 **p1** 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 **p2** 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 **p3** 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 **p4** 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 **p5** 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 **p6** 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 **p7** 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	Cancels any changes you've made to the custom bounding box and resets it to the original settings taken from the input. This control is only available if you have unchecked **useincomingboundingbox**.
box	src_color	red	The color of the custom bounding box in the 3D Viewer. This control is only available if you have unchecked **useincomingboundingbox**.
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	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. • **off** - doesn't display geometry outlines. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid +wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured +wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the object's display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.

Control (UI)	Knob (Scripting)	Default Value	Function
projection	projection_mode	perspective	Sets the projection type for rendered objects. Usually, it's best to select a type that's close to the object's surface shape. • off • perspective • planar • spherical • cylindrical **Note:** When **projection** is set to **off**, the UVProject node is essentially disabled.
plane	plane	XY	Sets the projection direction to project the texture image along the x, y, or z axis. **Note:** This dropdown menu is only available if you selected **planar** as the projection type.
project on	project_on	both	Sets which surfaces of a 3D object the projection falls on through the camera: • both • front • back
view frustum culling	frustum_culling	disabled	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.
invert u	u_invert	disabled	When enabled, the u coordinates are inverted on the horizontal axis.
invert v	v_invert	disabled	When enabled, the v coordinates are inverted on the vertical axis.

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	The patch's UDIM coordinates. Enter an alternative UDIM value here to offset the given patch to that point. Check **enable** to adjust the value here. 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

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 **u** and **v** 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: • **clamp** - Patch edges are stretched indefinitely. • **repeat** - Patches are tiled repeatedly. • **mirror** - Patches are mirrored repeatedly.
	wrap_v	clamp	Sets how existing patches are used to fill in the areas on the v axis where unique textures are not present: • **clamp** - Patch edges are stretched indefinitely. • **repeat** - Patches are tiled repeatedly. • **mirror** - Patches are mirrored repeatedly.
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	Either: • The 2D image you're using for the surface texture, or • Another shader node, such as Diffuse, Specular, or Emission. Adding several shader nodes one after the other allows you to produce more complex effects.

Control (UI)	Knob (Scripting)	Default Value	Function
Wireframe Tab			
channels	channels	rgba	The effect is only applied to these channels. You can use the checkboxes on the right to select individual channels.
operation	operation	opaque	Sets how the wireframe overlay is applied to the geometry: • **opaque** - display the wireframe on fully opaque black input geometry. • **see through** - display the wireframe on fully transparent geometry. • **over** - display the wireframe on top of the input shader or texture. • **multiply** - multiply the wireframe by the input shader or texture and display it on fully transparent geometry. • **modulate** - 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.
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 **file** control.
frame range	first	1	When **limit to range** is enabled, enter the first frame to write to the specified **file**.
	last	1	When **limit to range** is enabled, enter the last frame to write to the specified **file**.
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 **file**.
views	views	main	When you're working with stereo footage, select the required view.
file type	file_type	none	Select the file type you intend to write: • **none** - Nuke attempts to guess the **file type** from the **file** name, but you cannot set any type-specific controls. • **abc** - when the WriteGeo node is connected to a Scene node, writes to an **.abc** file and exposes the Alembic-specific controls (see **abc Options**). • **fbx** - when the WriteGeo node is connected to a Scene node, writes to an **.fbx** file and exposes the FBX-specific controls (see **fbx Options**). • **obj** - write to an **.obj** file.
abc Options (These controls are only exposed when file type is set to **abc**.)			
geometries	writeGeometries	enabled	When enabled, write the scene geometries into the **.abc** file.
pointClouds	writePointClouds	enabled	When enabled, write the scene point clouds into the **.abc** file.
cameras	writeCameras	enabled	When enabled, write the scene cameras to the **.abc** file.
axes	writeAxes	enabled	When enabled, write the scene axes into the **.abc** file.
storage format	storageFormat	HDF	Select the storage format to use when writing the file: • **HDF** - A storage format that maintains backwards compatibility. • **Ogawa** - A storage format that offers faster file reading and smaller files.
fbx Options (These controls are only exposed when file type is set to **fbx**.)			

Control (UI)	Knob (Scripting)	Default Value	Function
geometries	writeGeometries	enabled	When enabled, write the scene geometries into the **.fbx** file.
cameras	writeCameras	enabled	When enabled, write the scene cameras to the **.fbx** file.
lights	writeLights	enabled	When enabled, write the scene lights into the **.fbx** file.
axes	writeAxes	enabled	When enabled, write the scene axes into the **.fbx** file.
point clouds	writePointClouds	enabled	When enabled, write the scene point clouds into the **.fbx** file.
ascii file format	asciiFileFormat	disabled	When disabled, a binary .fbx file is written. Check **ascii file format** 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 **_fpc** 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 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

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
			render output of the scene; these are for display purposes only in the 3D Viewer. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 is rendered. This control is independent from the display selection, but has the same settings. • **off** - hides the 3D geometry object. • **wireframe** - displays only the outlines of the object's geometry. • **solid** - displays all geometry with a solid color. • **solid+wireframe** - displays the geometry as solid color with the object's geometry outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
Kernel File	kernelFile	none	Sets the file path of the kernel used for **Load** and **Save** operations. BlinkScript

Control (UI)	Knob (Scripting)	Default Value	Function
			kernels use the **.rpp** file extension.
Load	loadKernelFile	N/A	Click to load and compile the kernel specified in the **Kernel File** field.
Save	saveKernelFile	N/A	Click to save the current kernel to the location and file name specified in the **Kernel File** field.
Kernel Source			
Kernel Editor	kernelSource	ParticleDrag	Enter the kernel you intend to compile or edit the default ParticleDrag to suit your purposes. Click the **Recompile** button to see the result of any changes.
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	This defines the probability that any given particle is affected by this node. For each incoming particle, the op generates a random number between 0 and 1. If the number is greater than the defined **probability** value, then that particle is ignored and left unchanged. **0.0** - No particles are ever affected. **1.0** - Every particle is affected
min age	min_age	0	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 **0**-**1**.
max age	max_age	1	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 **0**-**1**.
random seed	seed	0	Altering this value produces different results for anything that requires random numbers. It is used in particular for **probability** but can also be used for the **range** knobs within a **ParticleEmitter**.
channels	channels	all	Select which channels to apply this force to. Particles can be emitted on one or more channels, only selected channels will have this force applied to them.

Properties - Region Tab

Control (UI)	Knob (Scripting)	Default Value	Function
region	region	none	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region are affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	If enabled, particles outside the **region** are affected, rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker is snapped to a new position, orientation, and size depending on the points selected.

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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Check **specify matrix** 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 **object** is set to **input**.
	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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: • **none** - nothing happens and the particle moves as normal. • **bounce** - the particle bounces off the surface. • **kill** - the particle is deleted.
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
			• **none** - nothing happens and the particle moves as normal. • **bounce** - the particle bounces off the surface. • **kill** - the particle is deleted.
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 **plane**, **sphere**, or **cylinder** uses Nuke standard primitives, but you can select **input** to use custom geometry attached to the **geometry** input.
	bounceaxis_ file_menu	N/A	Allows you to to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	bounceaxis_ snap_menu	N/A	• **Match selection position** - the bounce object is snapped to a new position depending on the points selected.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Match selection position, orientation** - the bounce object is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the bounce object is snapped to a new position, orientation, and size depending on the points selected.
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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the

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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker is snapped to a new position, orientation,

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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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 **.nkpc** file extension.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **file** field is **particle_cache.####.nkpc**, ParticleCache may generate files called **particle_cache.0001.01.nkpc**, **particle_cache.0001.02.nkpc**, and so on.
padding	particle_cache_padding	1	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 **shutter** value in a downstream ScanlineRender node). If you get a "Particle cache data not found" error when you enable **read from file**, you need to increase this value.
Render	Render	N/A	Click to render the particle system to the location specified in the **file** control.
read from file	particle_cache_read_from_file	disabled	When enabled, use the particle system rendered to the location specified in the **file** control. When disabled, re-evaluate the particle system as normal.
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 multiples 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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
curve editor	curves	N/A	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). **Note:** Changes in the curve editor are limited by the **Apply curve to** checkboxes. For example, changing the **size** curve has no effect if **size** is not checked under **Apply curve to**.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **x**, **y**, and **z** axes.
Uniform Strength	uniformStrength	1	Sets the strength applied to the directional force specified in the **Strength** 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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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.

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 **Ctrl/Cmd** 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. You can also hold down **Ctrl/Cmd+Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.

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 **display** selection, but has the same settings.
drag	drag	0	Sets the proportion of each particle's velocity that is lost per frame, where 0.01 = 1 percent and 1 = 100 percent. **Note:** Negative drag values increase the particle velocity.
rotational drag	rotational_ drag	0	Sets the proportion of each particle's rotation that is lost per frame, where 0.01 = 1 percent and 1 = 100 percent. **Note:** Negative values increase the particle rotation velocity.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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 PositionToPoints point cloud as the emitted particle.
	emit	The geometry from which the particles are emitted. You can also emit from PositionToPoints point clouds using any normals information present. See PositionToPoints for more information.
	merge	Another particle system, including another ParticleEmitter.

Control (UI)	Knob (Scripting)	Default Value	Function
ParticleEmitter 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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
start at	start_frame	0	Sets which frame the particles start emitting. Negative values cause the particles to start before frame 0, and positive values delay the particles. 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.
channels	channels	a	The particles only exist in the selected channel(s).
emit from	emit_from	points	Sets where particles emit from: • **points** - emit from geometry points, including PositionToPoints point clouds. • **edges** - emit from geometry edges.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **faces** - emit from geometry faces. **Note:** Enabling **only emit from selected** allows you to emit from points selected in a preceding GeoSelect node. • **bbox** - 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.
	emit_order	randomly	Sets how particles are emitted: • **randomly** - particles are emitted from a random point on each face, though the same seed is used each time once generated. • **uniformly** - particles are emitted from every vertex on every frame, ignoring the **emission rate** setting. • **in order** - particles are emitted from the vertices of the geometry input in ascending order.
	randomize_type	no_random_direction	Sets how the initial particle velocity directions are randomized: • **no random direction** - directions are not randomized. The emit object's normals are used to determine direction. • **randomized direction** - the initial directions are completely randomized. • **randomized outwards** - a randomly selected direction, depending on **emit from**: **bbox** - particles move away from the center. **points**, **edges**, and **faces** - particles move away at no more than 90 degrees from the nearest normal.
emission rate	rate	10	Sets the exact number of particles emitted per frame and is affected by the **rate channel** control. If your **rate**

Control (UI)	Knob (Scripting)	Default Value	Function
			channel 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 **emit from** sites. See GeoSelect for more information.
threshold	selection_ threshold	0.5	When **only emit from selected** is enabled and **emit from** is set to something other than **points**, 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	When **emit_order** is set to **uniformly**, 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. **Note:** 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.
rate variation	rate_variation	0	Produces a random emission variation by adding a Gaussian-distributed random number to the **emission rate** value multiplied by the **rate variation** value. Roughly speaking, 0 is equal to the **emission rate** and 1 is very random variation.
rate channel	N/A	disabled	Enables the associated rate channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	rate_channel	none	Sets the channel of the input geometry texture which is used to modulate the **emission rate**. 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	Produces a random lifetime variation by adding a Gaussian-distributed random number to the **max lifetime** value multiplied by the **max lifetime range** value. Roughly speaking, 0 is equal to the **max lifetime** and 1 is very random variation.
lifetime channel	N/A	disabled	Enables the associated lifetime channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	lifetime_ channel	none	Sets the channel of the input geometry texture which is used to modulate the **max lifetime**. 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 **max lifetime** than particles emitted from the dark parts (values closer to 0).
halflife	halflife	0	Sets a **halflife** 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 **halflife** (in the same way as radioactive decay). For example, after twice the **halflife** value in frames, only a quarter of the original particles will be left, and so on.
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		Gaussian-distributed random number to the **velocity** value multiplied by the **velocity range** value. Roughly speaking, 0 is equal to the **velocity** and 1 is very random variation.
velocity channel	N/A	disabled	Enables the associated velocity channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	velocity_ channel	none	Sets the channel of the input geometry texture which is used to modulate the **velocity**. 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 **velocity** (values closer to 1) than from the dark parts (values closer to 0).
rotation velocity	rotation_ velocity	0	Sets how quickly particles spin around their local y axis in 3D space. 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. **Note:** Rotation velocity is only applicable to particles with geometry, sprite rotation is not currently supported.
rotation velocity range	rotation_ velocity_ variation	0	Produces a random rotation velocityby adding a Gaussian-distributed random number to the **rotation velocity** value multiplied by the **rotationvelocity range** value. Roughly speaking, 0 is equal to the **rotationvelocity** and 1 is very random variation.

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 **none**.
	rotation_ velocity_ channel	none	Sets the channel of the input geometry texture which is used to modulate the **rotation velocity**. 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 **rotation velocity** (values closer to 1) than from the dark parts (values closer to 0).
size	size	0.1	Sets the size of each particle. If the **particle** input is geometry, the instance of that geometry at each particle is affected by this value.
size range	size_variation	0	Produces a random variation in particle sizeby adding a Gaussian-distributed random number to the **size** value multiplied by the **size range** value. Roughly speaking, 0 is equal to the **size** and 1 is very random variation.
size channel	N/A	disabled	Enables the associated size channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	size_channel	none	Sets the channel of the input geometry texture which is used to modulate the **size** of the particles. For example, if you are emitting from a Card which has a Ramp texture, the **size** 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).
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 massby adding a Gaussian-distributed random number to the **mass** value multiplied

Control (UI)	Knob (Scripting)	Default Value	Function
			by the **mass range** value. Roughly speaking, 0 is equal to the **mass** and 1 is very random variation.
mass channel	N/A	disabled	Enables the associated mass channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	mass_channel	none	Sets the channel of the input geometry texture which is used to modulate the **mass** of the particles. You can use this control to emit particles with different mass from different areas. 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 **mass** value (based on a percentage of the **mass** value) than from the dark parts (values closer to 0).
transfer velocity	transfer_ velocity	0	Sets the transfer strength of any velocity that the initial emitter had to the particles. Setting this to 0 transfers no velocity to the spawned particles. At value 1, full velocity is transferred from the originating particle.
transfer window	transfer_ window	1	Sets the time, in frames, to look forward and backward to determine the **transfer velocity**.
spread	spread	0	Applies a spread to the particles - by default, a cone shape around the direction of emission.
color	color	1	Sets the initial color of particles when the **particle** input is not connected.
color from texture	color_from_ texture	disabled	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.
input order	input_order	randomly	Sets the order of **particle** inputs used for the

Control (UI)	Knob (Scripting)	Default Value	Function
			representation: • **randomly** - a random input is picked for each particle emitted. • **in order** - the inputs are cycled through for each particle emitted.
start at	start_frame_ animation	first	Determines which frame a newly emitted particle's representation starts from: • **first** - uses the first frame from the input for each new particle. • **in order** - uses successive frames for each new particle. • **current** - uses the frame from which the particle was emitted. • **random** - uses a random frame within the representation's frame range.
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 **start at** > **in order** and **current** 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: • **constant** - particles do not animate, and keep the same representation for their entire lifetime. • **in steps** - the particle's representation advances frame by frame. • **randomly** - a different random frame is picked each time.
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 **velocity range**. You can achieve slightly

Control (UI)	Knob (Scripting)	Default Value	Function
			different effects by changing the seed number.
Region Tab			
region	region	none	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker is snapped to a new position, orientation,

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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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	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 **set to** 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 **chans** expression. **Note:** Particles are deleted if **none** is selected.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Match selection position, orientation, size** - the region marker 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 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 **Ctrl/Cmd** 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. You can also hold down **Ctrl/Cmd+Alt** and drag the pivot point to a new location in the 3D Viewer.

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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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
			settings don't affect the render output of the scene; these are for display purposes only in the 3D Viewer. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
from xyz	from	N/A	Sets the point of origin for the vector on the **x**, **y**, and **z** axes.
to xyz	to	N/A	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. The position of the vector has no effect and Gravity affects all particles equally, irrespective of mass.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation parameters

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	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particle's display mode. The Viewer can override this setting.
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 **display** 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 **max lifetime** control and within the **max lifetime range** specified.
age	showAge	off	Displays each particles age, which is calculated as **time/life** 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 **rotation_velocity** 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 **rotation_velocity** 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 **size** control and within the **size range** specified.
mass	showMass	off	Displays the mass of each particle as set in the ParticleEmitter **mass** control and within the **mass range** specified. A particle's mass is only useful when a force is applied to the particles.
channels	showChannels	off	Particles are emitted with channels **a** 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** and set your ParticleGravity node to only affect channel **a**.
axis scale	axisScale	1	When controls like **velocity as vector** and **orientation as axis** 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 **first particle** specified. You can use the **max particles** control to limit the amount of information on screen in large particle systems.
max particles	maxParticles	1000	

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **position**. A **strength** of 0 has no effect on the particles and a **strength** of 1 forces them to look at the **position** 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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and transform the region marker according to the transformation data

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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.

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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color

Control (UI)	Knob (Scripting)	Default Value	Function
			with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker is snapped to a new position, orientation,

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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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
			• **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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	How quickly the strength of the attraction falls off with respect to distance: • **none** - attraction or repulsion is constant, regardless of the distance from the **position** values. • **inverse** and **inverse square** - falloff is calculated with respect to the selected law.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - import a channel file and transform the region marker according to the transformation data in the channel file. Channel files contain a set of

Control (UI)	Knob (Scripting)	Default Value	Function
			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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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.

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	Sets how many steps of particle simulation take place per animation frame. Sometimes simulations cannot generate enough accuracy by calculating once per frame and the resulting particle movement can appear jagged. Increasing **steps per frame** causes the simulation to asses the movement of the particles multiple times per frame to smooth movement.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **rate channel** control of the

Control (UI)	Knob (Scripting)	Default Value	Function
			ParticleEmitter. If your **rate channel** is less than 1 all the way through, the spawn rate lessens.
rate variation	rate_variation	0	Produces a random emission variation by adding a Gaussian-distributed random number to the **emission rate** value multiplied by the **rate variation** value. Roughly speaking, 0 is equal to the **emission rate** and 1 is very random variation.
lifetime	lifetime	10	Sets the number of frames that each spawned particle exists for.
lifetime range	lifetime_ variation	0	Produces a random lifetime variation by adding a Gaussian-distributed random number to the **lifetime** value multiplied by the **lifetime range** value. Roughly speaking, 0 is equal to the **lifetime** and 1 is very random variation.
halflife	halflife	0	Sets a **halflife** 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 **halflife** (in the same way as radioactive decay). For example, after twice the **halflife** value in frames, only a quarter of the original spawned particles will be left, and so on.
velocity	velocity	1	Sets the speed in units per frame of the particles as they spawn.
velocity range	velocity_ variation	0	Produces a random velocity variation by adding a Gaussian-distributed random number to the **velocity** value multiplied by the **velocity range** value. Roughly speaking, 0 is equal to the **velocity** and 1 is very random variation.
rotation	rotation_	0	Sets how quickly spawned particles spin around their

Control (UI)	Knob (Scripting)	Default Value	Function
velocity	velocity		local y axis in 3D space. The y axis points in the direction the particles were initially spawned, 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.
rotation velocity range	rotation_ velocity_ variation	0	Produces a random rotation velocity by adding a Gaussian-distributed random number to the **rotation velocity** value multiplied by the **rotationvelocity range** value. Roughly speaking, 0 is equal to the **rotationvelocity** and 1 is very random variation.
size	size	0.1	Sets the size of each spawned particle. If the **particle** input is geometry, the instance of that geometry at each particle is affected by this value.
size range	size_variation	0	Produces a random variation in particle size by adding a Gaussian-distributed random number to the **size** value multiplied by the **size range** value. Roughly speaking, 0 is equal to the **size** and 1 is very random variation.
mass	mass	0.1	Sets the mass of each spawned 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 **mass** value multiplied by the **mass range** value. Roughly speaking, 0 is equal to the **mass** and 1 is very random variation.
transfer velocity	transfer_ velocity	1	Transfers velocity from the initial emitter to the spawned particles on a sliding scale - all inherited velocity at 1, and

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	When enabled, spawned particles inherit the velocity from the parent particle, but the direction of motion is dictated by the ParticleSpawn controls. When disabled, spawned particles inherit the direction of motion from the parent particle, but with increased velocity.
color	color	1	Sets the initial color of spawned particles when the **particle** 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 **particle** input, if connected, or the **color** control.
input order	input_order	randomly	Sets the order of **particle** inputs used for the representation: • **randomly** - a random input is picked for each particle emitted. • **in order** - the inputs are cycled through for each particle emitted.
start at	start_frame_	first	Determines which frame a newly emitted particle's

Control (UI)	Knob (Scripting)	Default Value	Function
	animation		representation starts from: • **first** - uses the first frame from the input for each new particle. • **in order** - uses successive frames for each new particle. • **current** - uses the frame from which the particle was emitted. • **random** - uses a random frame within the representation's frame range.
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 **start at** > **in order** and **current** 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: • **constant** - particles do not animate, and keep the same representation for their entire lifetime. • **in steps** - the particle's representation advances frame by frame. • **randomly** - a different random frame is picked each time.
max clip length	max_clip_ length	100	Sets the number of frames used in animation from the representation input.
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

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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl/Cmd** 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 **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **minimum** and **maximum** values. A **strength** of 0 has no effect on the particles and a **strength** 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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation parameters

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	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
channels	channels	all	Sets which particles are affected, by channel. For example, setting **channels** to **a** only affects particles emitted into the **a** channel in the ParticleEmitter node's **Properties** panel.
align mode	align	none	Sets the way sprite particles are aligned: • **none** - sprite particles are not aligned.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **spin** - sprite particles are aligned according to their rotation. • **velocity** - sprite particles are aligned according to their velocity. **Note:** This control has no effect on particles generated from geometry.
frame	frame	50	When **specify frame** is enabled, the **frame** control freezes the particles in the selected **channels** at the specified frame in the simulation. For example, you could freeze particles in a channel called **fog** at frame 50 while allowing particles in the other channels to simulate as normal.
specify frame	use_frame	disabled	When enabled, the **frame** control can be used to freeze particles at a certain frame in the simulation.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - export the translation parameters

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	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl/Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** 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
			• **none** - no falloff occurs, regardless of distance from the origin. • **inverse** and **inverse square** - falloff is calculated with respect to the selected law.
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	Sets which falloff law to use when calculating the effect of the force on each particle: • **none** - no falloff occurs regardless of distance from the origin. • **inverse** and **inverse square** - falloff is calculated with respect to the selected law.
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	Sets which falloff law to use when calculating the effect of the force on each particle: • **none** - no falloff occurs regardless of distance from the origin. • **inverse** and **inverse square** - falloff is calculated with respect to the selected law.
from xyz	from	0, 0, 0	Sets the point of origin for the arrow on the **x**, **y**, and **z** axes. The arrow determines the direction and velocity of the vortex effect. The bigger and longer the arrow, the stronger the effect.
to xyz	to	0, 1, 0	Sets the point of destination for the arrow on the **x**, **y**, and **z** axes. The arrow determines the direction and velocity of the

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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
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	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker 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 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 **Ctrl**/**Cmd** 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	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. You can also hold down **Ctrl**/**Cmd**+**Alt** 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. Check **specify matrix** 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.

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	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. • **off** - hides the particles. • **wireframe** - displays only the outlines of the particle. • **solid** - displays all particles with a solid color. • **solid+wireframe** - displays the particles as solid color with the particles outlines. • **textured** - displays only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture. • **unchanged** - doesn't change the particles display mode. The Viewer can override this setting.
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 **display** selection, but has the same settings.
from xyz	from	0, 0, 0	Sets the point of origin for the arrow on the **x**, **y**, and **z** axes. The arrow determines the direction and velocity of the wind effect. The bigger and longer the arrow, the stronger the effect.

Control (UI)	Knob (Scripting)	Default Value	Function
to xyz	to	0, 1, 0	Sets the point of destination for the arrow on the **x**, **y**, and **z** axes. The arrow determines the direction and velocity of the wind effect. The bigger and longer the arrow, the stronger the effect. **Note:** Particles are gradually accelerated, they aren't emitted at full speed.
drag	drag	0.2	Sets the amount of simulated drag applied to particles. Higher values drag the particles further from their origin, and vice versa.
air resistance	air_resistance	disabled	When enabled, simulated resistance is added to the drag control progressively slowing particles down over time in a similar way to ParticleDrag.
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 **a** and **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	Sets the region which you want to use to confine the particle effect to. For example, if you choose a **sphere**, only particles inside that sphere shaped region will be affected by particle effects. • **none** - all particles are affected as normal. • **sphere**, **box**, **half-space**, and **cylinder** - controls the region's boundary shape.
invert region	region_invert	disabled	When enabled, particles outside the region are affected rather than those inside it.
	file_menu	N/A	Select to import or export a channel file: • **Import chan file** - 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. • **Export chan file** - 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.
	snap_menu	N/A	• **Match selection position** - the region marker is snapped to a new position depending on the points selected. • **Match selection position, orientation** - the region marker is snapped to a new position and orientation depending on the points selected. • **Match selection position, orientation, size** - the region marker is snapped to a new position, orientation,

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 **Ctrl**/**Cmd** 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. You can also hold down **Ctrl**/**Cmd**+**Alt** and drag the pivot point to a new location in the 3D Viewer.
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	The matrix displays values from the object's transform, rotate, scale, skew, and pivot controls. Check **specify matrix** 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.

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.
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.
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 **zmap** 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 **shadow** and **highlight** 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
			Warning: DO NOT adjust the **midtone** 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 **znear** 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 **zfar** value.
keep outside zrange	outside_ zrange	disabled	When enabled, samples between the **znear** and **zfar** values are cropped. When disabled, samples outside the **znear** to **zfar** range are cropped.
bbox	bbox	N/A	Set the size of the crop box in the Viewer. By default, any areas outside this box are cropped. You can adjust the following: • **x** - the distance (in pixels) between the left edge of the image and the left side of the crop box. • **y** - the distance (in pixels) between the bottom edge of the image and the bottom edge of the crop box. • **r** - the distance (in pixels) between the left edge of the image and the right side of the crop box. • **t** - the distance (in pixels) between the bottom edge of the image and the top edge of the crop box. • **w** - the width of the crop box. This is only available if you click the **wh** button. • **h** - the height of the crop box. This is only available if you click the **wh** button. You can also adjust the crop box in the Viewer by dragging its edges.
use	use_bbox	enabled	Set whether to use the crop box in the Viewer.
keep outside bbox	outside_bbox	disabled	When enabled, any samples inside the crop box are cropped. When disabled, any samples outside the crop box are cropped.

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. 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. 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. 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. 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 **samples** value (5) and **frame range** 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 **samples** value (5) and **frame range** value (1-9) DeepFromFrames samples at frames 1, 3, 5, 7 and 9.
premult	premult	enabled	Set whether the input needs premultiplying. When disabled, DeepFromFrames assumes that the input is already premultiplied.
split alpha mode	alpha_mode	multiplicative	Set how the alpha channel is split: • **additive** - 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. • **multiplicative** - the samples are split so that each is 1-pow(1-alpha,1/numSamples). If the deep samples are flattened later on (for example, using DeepToImage), the alpha values match the originals.
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 furthermost 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. When disabled, DeepFromImage assumes that the input is already premultiplied.
specify z	set_z	disabled	When enabled, you can use the **z** field below to manually specify the Z depth for the single sample at each pixel. 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 **specify z**.

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: • **combine** - combine the samples from the **A** and **B** inputs. • **holdout** - hold out samples from the **B** input by the samples in the **A** input. This removes or fades out samples in input **B** that are occluded by samples in input **A**. • **plus** - adds **A** and **B** overlapping samples, which can be useful when recombining data after a holdout.
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 **operation** is set to **combine**.
drop zero threshold	drop_zero_ threshold	0.0000001	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. This control is only available when **operation** is set to **holdout**.
metadata from	metainput	B	Sets which input's metadata is passed down the node tree. **Note:** When **metadata from** is set to **All** and there are keys with the same name in both inputs, keys in B override keys in A.
volumetric holdout	volumetric_ holdout	disabled	Enable **volumetric holdout** if you want Nuke to calculate occlusion using the values of the **holdout** samples in front of samples from **main**. This is a more accurate representation of occlusion at depth, but can take longer to process. For example: Depth 0 … Depth INF M0 H0 H1 H2 M2 H3 M4 M = main sample H = holdout sample **M0** remains unchanged since there are no holdout samples before it. **M2** is affected by the combined **H0**, **H1**, and **H2** holdout samples and **M4** is affected by all holdout samples.

Control (UI)	Knob (Scripting)	Default Value	Function
			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. **Note:** When disabled, deep samples that coincide with a holdout are removed and everything 'deeper' is also removed.

DeepRead

The DeepRead node loads deep images from disk in two formats:

- DTEX (generated from Pixar's PhotoRealistic RenderMan® Pro Server).
- Scanline OpenEXR 3.2.4, or above (tiled OpenEXR 3.2.4, 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	The image to be loaded from disk. This file should be in: • DTEX format, generated from RenderMan Pro Server, or • Scanline OpenEXR 3.2.4 format. For frame numbers, you can use **#** for each digit or alternatively, use printf-style formatting (**%04d**).
Localization Policy	localizationPolicy	from auto-localize path	Sets the local file caching behavior. Copies of the files are stored in a specified local folder for faster access times: • **on** - the files are cached, regardless of location, as long as the **limit to (GB)** limit is not breached. • **from auto-localize path** - the files are cached if they reside in the **auto-localize from** directory, as long as the **limit to (GB)** limit is not breached. • **on demand** - only localize these source clips when you manually update them. See Nuke's Online Help for more information. • **off** - the files are never cached, regardless of location.
Update	updateLocalization	N/A	When this DeepRead node is set to **Localization Policy** > **on demand**, click **Update** to manually localize the files from the source files.
format	format	N/A	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 **new** to create a new format from scratch.
proxy	proxy	N/A	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.

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 **new** 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	Sets how the sequence displays before the first frame you've defined. • **hold** - select to show a still picture of the first frame in the frame range. • **loop** - select to start over and keep looping the span of the frame range before the first frame in the frame range. • **bounce** - select to play the span of the frame range backwards and forwards between the frame range limits. • **black** - select to display a black frame before the first frame.
	last	N/A	Sets the last frame in the range of frames to use for the image sequence.
	after	hold	Sets how the sequence displays after the last frame you've defined. • **hold** - select to show a still picture of the last frame in the frame range. • **loop** - select to start over and keep looping the span of the frame range after the last frame in the frame range. • **bounce** - select to play the span of the frame range backwards and forwards between the frame range limits.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **black** - select to display a black frame after the last frame.
frame	frame_mode	expression	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: • **expression** - 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 **frame+499**. • **start at** - 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. • **offset** - 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 **499** as the constant offset.
	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: • **error** - display an error on the node and in the Viewer at any missing frames. • **black** - set any missing frames to black. • **checkerboard** - replace any missing frames with a checkerboard image. • **nearest frame** - replace any missing frames with their nearest frame.
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 .**dtex** file: • **auto** - Nuke automatically detects the file type by looking at the subimage name. If the name is either **Deep Shadow** or ends with (or is) **.deepopacity**,

Control (UI)	Knob (Scripting)	Default Value	Function
			Nuke treats the file as a deep opacity file. • **deepopacity** - forces Nuke to treat the file as an accumulated deep opacity file, corresponding to a RenderMan Display Driver configuration of: Display "Filename.dtex" "deepshad" "deepopacity" • **alpha** - forces Nuke to treat the file as the newer point-sampled alpha or color, corresponding to a RenderMan Display Driver configuration of either: Display "Filename.dtex" "deepshad" "a" or Display "Filename.dtex" "deepshad" "rgba"
discrete	discrete	disabled	When enabled, Nuke treats the .**dtex** file as discrete samples, with the front and back being the same. This control is only relevant for deep opacity files, as color deep compositing files are always discrete.
premultiply	premult	disabled	When enabled, Nuke premultiplies the values from the **.dtex** file. When disabled, Nuke assumes the values have already been premultiplied.
raw values	raw	disabled	When enabled, deep samples are read "as is", without any processing.
exr Options (These controls are only exposed when loading a **.exr** file.)			
do not attach prefix	noprefix	disabled	When enabled, metadata keys are read as they are, without attaching a prefix to them. When disabled, the prefix **exr** is attached to metadata keys to make them distinct from other metadata in the tree.

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 Unpremult 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	The channels to copy from the **color** input. You can use the checkboxes on the right to select individual channels.
target input alpha	targetInputAlpha	disabled	When disabled, Nuke distributes the color to each sample by unpremultiplying by the **color** image's alpha and then remultiplying by the alpha of each sample. However, sometimes the alpha from the final high-quality flat render might not match the alpha

Control (UI)	Knob (Scripting)	Default Value	Function
			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. When **target input alpha** is enabled, the **color** input's alpha is distributed amongst the samples so that the final resulting alpha after flattening of the deep data matches the **color** input's alpha.

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	Select how to resize the image: • **to format** - Set the output width and height to the selected format. Choose the format in the **output format** dropdown menu. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the

Control (UI)	Knob (Scripting)	Default Value	Function
			image to the format indicated on the **Project Settings** dialog. • **to box** - Set the output width and height to dimensions you define (in pixels). Enter values in the **width/height** and **pixel aspect** fields to specify the dimensions. This option is useful for creating a thumbnail of the input image. • **scale** - Set the output width and height to a multiple of the input size. Use the **scale** 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 **resize type**.
output format	format	root.format	The format to which you want to output the deep image sequence. If the format does not yet exist, you can select **new** to create a new format from scratch. The default setting, **root.format**, resizes the image to the format indicated in the **Project Settings**. This control is only available if you have set **type** to **to format**.
width/height	box_width	200	The output width for your deep image. The units are in pixels. This control is only available if you have set **type** to **to box**.
	box_height	200	The output height for your deep image. The units are in pixels. This control is only available if you have set **type** to **to box**.
force this shape	box_fixed	disabled	When enabled, the output image matches the **width/height** fields exactly, even if the original image is a different shape. To achieve this, one direction gets either clipped or padded.

Control (UI)	Knob (Scripting)	Default Value	Function
			When disabled, the output image is approximately the same shape as the original, rounded to the nearest integer number of pixels. This control is only available if you have set **type** to **to box**.
pixel aspect	box_pixel_aspect	1	Sets the pixel aspect ratio for the output image. This control is only available if you have set **type** to **to box**.
scale	scale	1	The scale factor for the width and the height. To scale each direction separately using different scale factors, click the **2** button. This control is only available if you have set **type** to **scale**.
resize type	resize	width	Choose the method by which you preserve or override the original pixel aspect ratio. Select: • none - to not resize the original. • **width** - 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. • **height** - 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. • **fit** - 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. • **fill** - 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. • **distort** - to scale the original so that both sides fill the output dimensions. This option does not preserve the

Control (UI)	Knob (Scripting)	Default Value	Function
			original aspect ratio, so distortions may occur.
center	center	enabled	When enabled, DeepReformat translates the image to center it in the output. When disabled, DeepReformat translates the image so that the lower left corners line up.
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	When enabled, pixels outside the image boundary are set to black. When disabled, the outside area is filled with the outermost pixels of the image area.
preserve bounding box	pbb	disabled	When enabled, pixels outside the output format are preserved. When disabled, pixels outside the output format are clipped off.

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	The pixel to sample. You can also set this by moving the **pos** indicator in the Viewer.
accumulate	accumulate	disabled	When enabled, DeepSample shows cumulative sample values of the sample pixel (the final composited values as they get built up). When disabled, DeepSample shows the individual sample values of the sample pixel.
channels	channels	rgba	The channels to display in the sample list. You can use the checkboxes on the right to select individual channels.
[sample list]	list	N/A	The deep samples at the **pos** pixel. The values shown include: • **deep.front** - The front-most depth value.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **deep.back** - The furthermost depth value. • any channels you've selected using the **channels** controls. You can use the right-click menu to copy the currently selected value (**Copy**) or all values in the table (**Copy All**).

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	When enabled, DeepToImage calculates both the front and back depths of each sample. 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.

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: • **off** - hides the points. • **wireframe** - displays only the outlines of the points. • **solid** - displays all points with a solid color. • **solid+wireframe** - displays the points as solid color with their outlines. • **textured** - displays the only the surface texture. • **textured+wireframe** - displays the wireframe plus the surface texture.
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 **display** 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 **none**.
	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 3.2.4 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. If you set this to something other than **all** or **none**, 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 **proxy** mode is on and the required resolution is less than or equal to the **proxy format**.
frame	frame_mode	expression	Sets the frame mode:

Control (UI)	Knob (Scripting)	Default Value	Function
			• **expression** - 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 **frame-499**. 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 **frame*2**. 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. • **startat** - 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 **1** 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 **100** in the field, frame 500 is written out as image.0100.exr. • **offset** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			frame as image.0001.exr rather than image.0500.exr, you can use **-499** 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 **frame** mode, you can enter a start frame, an offset, or an expression here.
views	views	**dependent on Project Settings**	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. **Note:** If **file type** is left blank, Nuke disables any file-type-specific controls.
exr Options (These controls are only exposed when **file type** is set to **exr**.)			
datatype	datatype	16 bit half	Sets the bit depth of the rendered **.exr** files: • 16-bit half • 32-bit float
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: • **no metadata** - No custom attributes are created, and only metadata that fills required header fields is written out. • **default metadata** - The optional timecode, edgecode, frame rate, and exposure header fields

Control (UI)	Knob (Scripting)	Default Value	Function
			are also filled using metadata values. • default metadata and exr/* • all metadata except input/* • all metadata
do not attach prefix	noprefix	disabled	When enabled, unknown metadata keys are written into the file as they are. When disabled, unknown metadata keys have the prefix **nuke** attached to them when they are written into the file.
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	When enabled, only frames within the **frame range** are rendered. **Note:** If the specified frames are outside the sequence range, the DeepWrite node behaves as if it is disabled.
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	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: • If your input is an **.exr** file, the file may already contain both views. This is because .exr files support multiple views in a single file. • 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.

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	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. **Note:** If the images include areas that are very red, green, or blue, adding more color into them may not produce the best possible results.
(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 **Project Settings**.	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	The image that contains the two views you want to dissolve between: • If your input is an **.exr** file, the file may already contain both views. This is because **.exr** files support multiple views in a single file. • 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.

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	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: • If your input is an **.exr** file, the file may already contain both views. This is because .exr files support multiple views in a single file. With

Connection Type	Connection Name	Function
		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. • 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.

Control (UI)	Knob (Scripting)	Default Value	Function
ReConverge Tab			
Converge upon xy	convergencepoint	0, 0	The x and y coordinates of the convergence point (the point you want to appear at screen level when viewed with 3D glasses). You can also move the point by dragging the convergence point overlay in the Viewer.
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	The view to move to achieve the convergence shift: • **shift right** - move the right view. • **shift left** - move the left view. • **shift both** - move both views.

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	1. Click **add** to add rows of controls to the control panel, or **delete** to remove unnecessary rows. 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: • On one row, select left under **get**, and right under **from** (“get left from right”). The left view is now replaced with the right view. • On another row, select right under **get**, and left under **from** (“get right from left”).

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	The image that contains the two views you want to display side by side: • If your input is an **.exr** file, the file may already contain both views. This is because **.exr** files support multiple views in a single file. • 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.

Control (UI)	Knob (Scripting)	Default Value	Function
SideBySide Tab			
vertical	vertical	disabled	Enable this to display one view on top of another. Disable this to display the two views next to each other.
view1	view1	N/A	Select the view to display on the left (or the top if you have checked **vertical**).
view2	view2	N/A	Select the view to display on the right (or the bottom if you have checked **vertical**).
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 **Project Settings**, disable **get FPS from metadata** 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 **Project Settings**. If you want to override the value in the input, disable this control and enter the required value in the **fps** field.
start frame	frame	1	If you want to specify a different start frame than the first frame, enable **use start frame?** 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 **start frame** 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	Set the image and metadata combination you intend to pass down the tree: • **Image+Meta** - 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. • **Meta only** - only use the metadata from the Meta input. • **Meta+Image** - 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. • **Image only** - only use the metadata from the

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	Enter search criteria to select the metadata to copy from the Meta input. For example, if you enter **f** in the copy only field under **Meta filtering**, only the keys and values that include the letter **f** are copied from the Meta input.
within	metadatafilterMode	keys and values	Limit the metadata you want to pass down the tree to certain fields: • keys and values • keys only • values only
Image copy only	imageMetadatafilter	N/A	Enter search criteria to select the metadata to copy from the Image input. For example, if you enter **f** in the copy only field under **Image filtering**, only the keys and values that include the letter **f** are copied from the Image input.
within	imageMetadatafilterMode	keys and values	Limit the metadata you want to pass down the tree to certain fields: • keys and values

Control (UI)	Knob (Scripting)	Default Value	Function
			• keys only • values only

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	1. First add, remove, and reorder metadata placemarkers using the +/- and up/down arrow buttons. 2. Double-click the **key** field in the placemarker to select the metadata you want to edit or remove. The **Pick metadata key** dialog opens. If you want to add metadata, simply enter a new key name in the field at the bottom of this dialog. 3. Double-click the **action** field in the placemarker to toggle the operation between **set** and **remove**. 4. If you want to add or edit metadata, double-click the **value** field in the placemarker and enter a new value for the selected key.

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. The metadata displayed depends on input file type. For example, a JPEG might only contain **input/** keys, whereas QuickTimes contain **input/** and **quicktime/** keys.
search metadata for	metadatafilter	N/A	Filter the metadata by entering text in this field. By default, only metadata containing the **keys** and **values** entered are displayed. You can change this behavior using the **within** control.
within	metadatafiltermode	keys and values	Defines how to filter the search metadata for control. You can search **keysandvalues**, **keysonly**, or **valuesonly**.

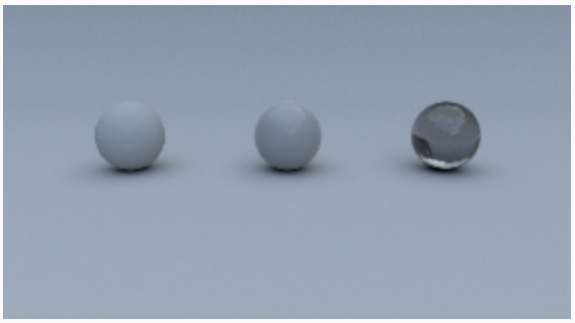
ToolSets Nodes

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

2D ToolSets

Nuke ships with the following 2D ToolSets:

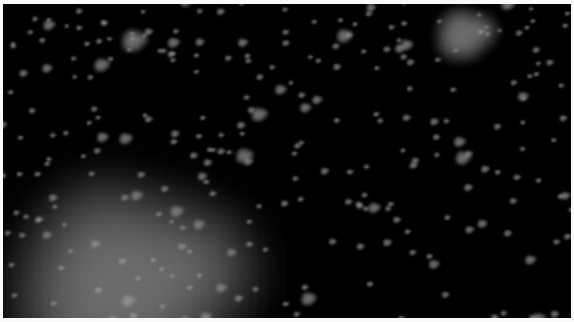
ToolSet	Description	Result
CG_Beauty		
TB_CG_Beauty	A basic approach to splitting out and merging back together several layers from multi-channel EXRs using some common third-party renderers, such as Arnold, Modo, and RenderMan.	
Keying		
TK_Keying	An example of combining different keys from blue or 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.	

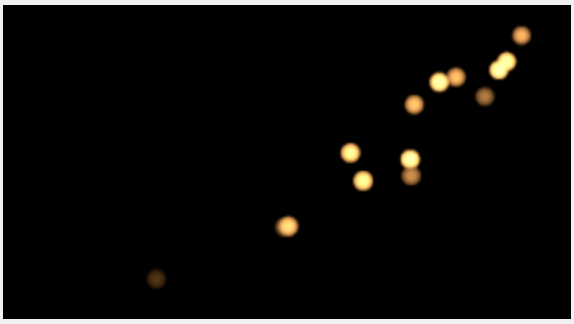
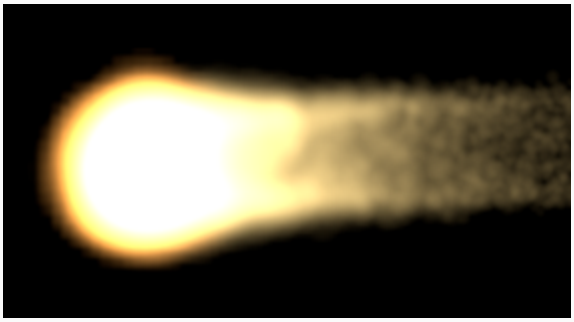
ToolSet	Description	Result
SmartPaint		
TSVSmartVectorFix	An example of rendering vectors for a plate and then using VectorDistort to warp the source. An example image is then merged on top of the source.	
TSVSmartVectorGrade	An example of rendering vectors for a plate and then using VectorDistort to 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

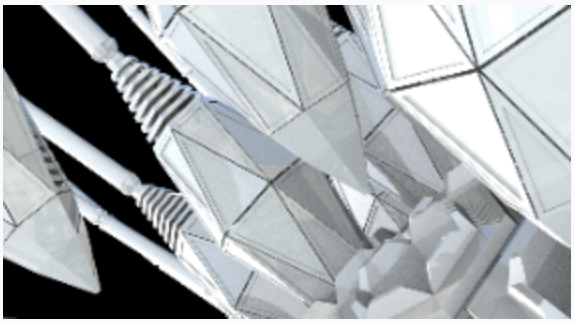
Nuke ships with the following 3D ToolSets:

ToolSet	Description	Result
Particles		

ToolSet	Description	Result
P_DustHit	Creates an adjustable dust particle system. Double-click the particle system to open its **Properties** panel and then click the **S** icon to display the contents of the group. The image shows the 3D particle system rendered through a ScanlineRender node.	
P_FogBox	Creates an adjustable fog particle system. Double-click the particle system to open its **Properties** panel and then click the **S** icon to display the contents of the group. The image shows the 3D particle system rendered through a ScanlineRender node.	
P_SnowRain	Creates an adjustable snow or rain particle system. Double-click the particle system to open its **Properties** panel and then click the **S** icon to display the contents of the group. The image shows the 3D particle system rendered through a ScanlineRender node.	

ToolSet	Description	Result
P_Sparks	Creates an adjustable trail of sparks. Double-click the particle system to open its **Properties** panel and then click the **S** icon to display the contents of the group. The image shows the 3D particle system rendered through a ScanlineRender node.	
P_Trail	Creates an adjustable comet effect. Double-click the particle system to open its **Properties** panel and then click the **S** icon to display the contents of the group. The image shows the 3D particle system rendered through a ScanlineRender node.	
Projection and Rig Removal		
TP_RRCleanProject	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.	
TP_RRCleanTexture	An example showing projecting a single frame through a static camera onto geometry,	

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_RRExitsingTexture	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 **Tracking** 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.

Annotations

You can use the Annotations node to view annotation comments created in Nuke Studio. The Annotations node is generated during the Create Comp process. This node cannot be added manually. See more about the workflow at Create Comp with Annotations.

Inputs and Controls

Control (UI)	Knob (Scripting)	Default Value	Function
Annotations Tab			
file	file	[filepath]	The file to be read in as the contents of this Annotations.
Reload	reload_script	N/A	Re-read the file contents and re-generate the internals of this Annotations.
Open	open	N/A	Open the file in a new Nuke session.
annotation			
	annotation_key	1	The annotation currently showing.
	annotation_count	[total number of annotations]	The total number of annotations.

Control (UI)	Knob (Scripting)	Default Value	Function
	prev	N/A	Allows you to jump to the previous annotation.
	next	N/A	Allows you to jump to thenext annotation.

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.
time range	begintime	0, 0	Sets the start and end times for the audio in Nuke.

Control (UI)	Knob (Scripting)	Default Value	Function
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 bake kernels, and they 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. To prevent unexpected crashes, the Safety Rails feature can be switched on while prototyping kernels to catch common errors and out-of-bounds memory accesses. However, code compiled from the Kernel Source can still 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			
Bake	bake	N/A	Click to disable edits and cache any Library Files into the node for easy copy/paste sharing. The BlinkScript icon will update to display the baked status of the node:
Make Live	makeLive	N/A	Click to enable edits, clear any cached Library Files and read them from the file path specified in the library files tab. The BlinkScript icon will update to display the live status of the node:
Protect	protectButton	N/A	Click to create a version of the node that uses an encrypted source and has all kernel editing options hidden and encrypted. **Note:** Note: If a live BlinkScript node is protected, the library files will not be baked into the node. The BlinkScript icon will update to display the protected status of the node:

Control (UI)	Knob (Scripting)	Default Value	Function
Kernel File	kernelSourceFile	none	Sets the file path of the kernel used for **Load** and **Save** operations. BlinkScript kernels use the **.rpp** file extension.
Load	reloadKernelSourceFile	N/A	Click to load and compile the kernel specified in the **Kernel File** field.
Save	saveKernelFile	N/A	Click to save the current kernel to the location and file name specified in the **Kernel File** 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 Source	kernelSource	Swirlomatic	Enter the kernel you intend to compile or edit the default Swirlomatic to suit your purposes. Click the **Recompile** button to see the result of any changes and view any listed errors.
Kernel Parameters Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • it was not possible to create a context for

Control (UI)	Knob (Scripting)	Default Value	Function
			processing on the selected GPU, such as when there is not enough free memory available on the GPU. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: If frame rendering on the GPU fails due to lack of memory, it will fall back to the CPU. When this occurs, a warning message will be printed to the console.
Vectorize on CPU	vectorize	enabled	When enabled, use SIMD instructions on the CPU where possible. **Note:** This is currently an experimental feature and vectorization might fail for some valid Blink kernels.
Safety Rails	safetyRails	disabled	When enabled, additional code is generated to check for, catch and safely handle out-of-bounds memory accesses, which are a common cause of BlinkScript crashes. Invalid accesses are printed to the Nuke terminal. **Warning:** When disabled, the code is generated to maximize performance without the Safety Rails preventing any crashes. It is recommended to enable Safety Rails during development and to disable once complete.
Input Group	Swirlomatic_src	rgba	Specifies input channels for each of BlinkScript's images to read from.
Swirl Amount	Swirlomatic_Amount	180 Radius: 320	Adjusts the result of the SwirlomaticKernel by this factor.

Control (UI)	Knob (Scripting)	Default Value	Function
		Center: x = 640 y = 320	**Note:** Swirl parameters are the only control exposed by the default SwirlomaticKernel. For more information on writing kernels and some examples, see the Blink Developer's Guide.
Output Channels	outputChannels	rgba	Specifies output channels for BlinkScript to write its output to.
format	format	Dependent on **Project Settings**	Sets the output format when **Specify output format** is enabled, but otherwise defaults to the input format size.
Specify output format	specifiedFormat	disabled	When enabled, allows you to set the output format using the **format** control. Enabling this control also exposes the **format** dropdown in the published Group node.
Library Files Tab			
Library Files	libraryFiles	N/A	Library Files contain user-defined helper functions and macros that can be used in the BlinkScript. Status information is displayed next to the file path name: • **OK** - the file is found and loaded. • **File Not Found** - no file at the specified path. • **Compilation Error** - the file contains compilation errors.
File Path	libraryFilePicker	N/A	Specify a file to be added to the list of Library Files. The library Files extension is **.blib**.
Add	addLibraryFile	N/A	Click to add the specified file path to the list of Library Files.

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. Setting a dropdown to **none** 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 **color**, **opacity**, and **border** 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 **.nk** script to the location

Control (UI)	Knob (Scripting)	Default Value	Function
			specified in the **file** control. Publishing does not add the contents of the LiveGroup to the current script, instead nodes within the LiveGroup are read from the external script.
Make Editable	make_editable	N/A	Click to change the LiveGroup to the editable state. **Make Editable** adds the contents of the LiveGroup to the current script when the script is saved.
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 **.nk** script specified in the **file** control to create the output.
Open	open	n/a	Click to open the **.nk** script specified in the **file** control in a new Nuke session.
Render	render	n/a	Click to render the **.nk** script specified in the **file** control and output the results from the LiveGroup node.
read file for output	reading	disabled	When enabled, the LiveGroup node reads in the rendered image rather than calculating the output of the script. When disabled, Nuke calculates the output of the LiveGroup script.
missing frames	on_error	error	Sets the behavior when there is an error opening the output file: • **error** - display an error message on any missing frames. • **black** - replace any missing frames with black. • **checkerboard** - replace any missing frames with a checkerboard image. • **read input** - display the result of the input tree rather than the rendered file on any missing frames.
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	Sets the name of the node to use instead of the Output node in the LiveGroup. You can use this control to override what is set as the Output node in the LiveGroup script.
enable	useOutput	disabled	When enabled, the node specified in the **output node** 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	Sets the LiveGroup from which the input is taken. Only LiveGroups from the script entered in the **file** control can be referenced.
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 **file** 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	This image sequence is passed through unchanged. This input is optional - you don't need to connect NoOp to the node you want it to control.

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 **.nk** script to use as the contents of the precomp.
Reload	reload_script	N/A	Click to reload the **.nk** script specified in the **file** control.
Open	open	N/A	Click to open the **.nk** script specified in the **file** control in a new Nuke session.
Render	render	N/A	Click to render the **.nk** script specified in the **file** control and output the results from the Precomp node.
read file for output	reading	disabled	When enabled, the Precomp node reads in the rendered precomp image rather than calculating the output of the precomp script. When disabled, Nuke calculates the output of the precomp script.
missing frames	on_error	error	Sets the behavior when there is an error opening the output file: • **error** - display an error message on any missing frames. • **black** - replace any missing frames with black.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **checkerboard** - replace any missing frames with a checkerboard image. • **read input** - display the result of the input tree rather than the rendered file on any missing frames.
Reload	reload_write	N/A	Click to re-read the image from disk.
advanced			
output node	output	N/A	Sets the name of the Write node to use instead of the Output node in the precomp. You can use this control to override what is set as the Output node in the precomp script.
enable	use_output	disabled	When enabled, the Write node specified in the **output node** 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 **project directory** using an expression so that if the **.nk** 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 **.nk** file in the **label** 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.

Control (UI)	Knob (Scripting)	Default Value	Function
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. **Tip:** You can also add expressions to this knob by right clicking and selecting Add expression. This enables you to reference variables, see more at Using Variables with the Root Node.
	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. When disabled, adding new 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			Tip: You can also add expressions to this knob by right clicking and selecting Add expression. This enables you to reference variables, see more at Using Variables with the Root Node.
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 **scale** or **format** as specified by the proxy type control.
	proxy_type	scale	Sets the proxy type when proxy mode is enabled: • **format** - the proxy resolution is determined by the **proxy format** control. • **scale** - the proxy resolution is determined by the **proxy scale** control.
proxy scale	proxy_scale	0.5	Sets the proxy resolution when the proxy type control is set to **scale**.
proxy format	proxy_format	1K_Super_35	Sets the proxy resolution when the proxy type control is set to **format**.
read proxy files	proxySetting	if larger	Sets when Read nodes fallback

Control (UI)	Knob (Scripting)	Default Value	Function
			to the proxy resolution when **proxy mode** is enabled: • **never** - the proxy resolution files are never used. • **if larger** - the proxy resolution files are used if the files are equal to or larger than the scaled size. • **if nearest** - the files closest to the scaled size is used. • **always** - the proxy resolution files are always used.
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	Sets the Viewer render mode: • **classic** - enables the legacy scanline by scanline progressive rendering method. • **topdown** - enables the top-down rendering to render the full frame. Although **topdown** rendering produces the full frame faster, it disables progressive rendering and uses more memory. You may want to use the **classic** method if you're only interested in the first few scanlines in the Viewer.
Color Tab			

Control (UI)	Knob (Scripting)	Default Value	Function
color management	colorManagement	Nuke	Sets which colorspaces are available to Read/Write nodes and Viewer processLUTs in the current script. • **Nuke** - only the Nuke root colorspaces are available. • **OCIO** - the specified OCIO config colorspaces are available as well as Nuke root colorspaces.
OCIO config	OCIO_config	nuke-default	When color management is set to **OCIO**, sets the configuration to use and populates the **default LUT settings** appropriately. Selecting **custom** allows you to reference a custom OCIO color file using the **custom OCIO config** control.
custom OCIO config	customOCIOConfigPath	none	When OCIO config is set to custom, enter the file path and name of the **.config** file.
default LUT settings			
working space	workingSpaceLUT	linear	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. If color management is set to

Control (UI)	Knob (Scripting)	Default Value	Function
			Nuke, this control is always set to **linear**.
monitor	monitorLUT	sRGB	Sets the default LUT for postage stamps, OpenGL textures, and all non-Viewer image and color displays. If your Viewer process is a simple LUT, set this control to the same LUT, although **sRGB** provides an acceptable result is most cases. **Note:** When **color management** is set to **OCIO**, these colorspaces are grouped by the Display and saved in the **Project Settings**. Other colorspace types are grouped by the family name.
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

Control (UI)	Knob (Scripting)	Default Value	Function
			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.
luts	luts	none	Displays the lookup curves used to convert between file/device colorspaces and the linear working colorspace used for internal operations. **Note: SLog** has been deprecated in favor of **SLog1**, but remains in the list to ensure backward compatibility.
+	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	Click to remove a view from the script.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: You cannot remove a view if it is the only view in the script.
up	views	N/A	Click to move a view up or down the **views** 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. **Note:** The colors are only visible in the script when **Use colors in UI?** is enabled.
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. 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 **views**

Control (UI)	Knob (Scripting)	Default Value	Function
			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.)			
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	When enabled, all the system fonts are available in addition to those that ship with Nuke.

Control (UI)	Knob (Scripting)	Default Value	Function
			When disabled, only the fonts that ship with Nuke are available.
Rescan font path	RescanFreeTypeMappingPaths	N/A	Click to rescan the specified **project font path** 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	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. **Note:** Disabling this control may speed up the general analysis.
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	This controls the range of frames any analysis runs over: • **Specified Range** - reads the **Analysis Start** and **Analysis Stop** fields for the range of frames to analyze. • **Source Clip Range** - automatically determines the range of frames to analyze from the length of the clip attached to the **Src** input. • **Current Frame** - the analysis occurs only on the current frame. This is useful for correcting any errors that may have occurred while analyzing the entire clip.
Analysis Start	start	0	The first frame analyzed if **AnalysisRange** is set to **SpecifiedRange**.
Analysis Stop	stop	100	The last frame analyzed if **AnalysisRange** is set to **SpecifiedRange**.
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. • **Analysis Region BL** - controls the position of the bottom left corner of the analysis region. • **Analysis Region TR** - 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: • **Low** - low quality but quick to render. • **Medium** - uses a bilinear filter. This gives good results and is quicker to render than **High** quality filtering. • **High** - 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 un-synchronized 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	Defines the width and height of the control block (in pixels) centered around a particular pixel analysed by the deflicker algorithm. **Note:** The default value avoids the loss of detail and noisy motion fields associated with higher and lower **BlockSize**, and rarely needs adjusting.
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 **UseMotion** 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 **Grain** 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	Selects whether the grain is sampled from the **Grain** input or from a set of standard stocks. • **Preset Stock** - grain characteristics are sampled from the film stock specified in the **Preset Stock** field. • **From Grain Clip** - samples and reconstructs the grain characteristics from the Grain input.
Preset Stock	presetStock	FUJIF250under 2K	The film stock that grain characteristics are sampled from when **GrainType** is set to **PresetStock**.
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	Sets whether to render the result or a test image. • **Result** - shows the **Src** input with the grain applied. • **Grain Plate** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			indistinguishable from the outer area, then you have a good grain sample.
Analyse	analyse	N/A	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. **Note:** A warning displays when the input clip changes.
Analysis Region			
Analysis Region BL	regionBL	N/A	A selection box that marks the region of image used to analyze the grain when **GrainType** is set to **From Grain Clip**. This part of the frame must contain no image detail, only grain. • **Analysis Region BL** - controls the position of the bottom left corner of the analysis region. • **Analysis Region TR** - controls the position of the top right corner of the analysis region.
Analysis Region TR	regionTR	N/A	
Analysis Frame	frame	1	Sets the frame to sample the grain from.
Grain Colour Space	grainColourSpace	sRGB	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. • Cineon • sRGB • Linear

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	Sets what color space the grain sample is re-applied to the image: • **Cineon** / **sRGB** / **Linear** - the grain sample is applied in the specified space. • **Grain Colour Space** - the grain sample is applied in the color space set in the **Analysis Range** > **Grain Colour Space** field.
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 **Grain** image.
Sampled Response Mix	responseMix	1	Decreasing the **Sampled Response Mix** control reduces the effect of the response curves until, at 0, they have no effect on the output. **Note:** This control is only available if **Use Sampled Response** is enabled.
Sample Grain Response	sample	N/A	Click to update the response curves from the current frame. Multiple clicks accumulate the grain response rather than resetting every time. **Note:** This control is only available if **Use Sampled Response** is enabled.
Reset Grain Response	reset	N/A	Click to reset the grain curves to their default (flat) response. **Note:** This control is only available if **Use Sampled Response** is enabled.
Draw Response	drawResponse	disabled	Overlay the response curves on the bottom left corner of the viewer. **Note:** This control is only available if **Use Sampled Response** is enabled.
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	Defines the area to repair: • **Box** - repair the area inside a rectangular box, controlled by the **Rig Region Box** controls or the on-screen box. • **Src Alpha** - repair the region defined by the alpha of the **Src** input. • **Src Inverted Alpha** - repair the region defined by the inverted alpha of the **Src** input. • **RigMask Luminance** - repair the region defined by the luminance of the **Rig Mask** input. • **RigMask Inverted Luminance** - repair the region

Control (UI)	Knob (Scripting)	Default Value	Function
			defined by the inverted luminance of the **Rig Mask** input. • **RigMask Alpha** - repair the region defined by the alpha of the **Rig Mask** input. • **RigMask Inverted Alpha** - repair the region defined by the inverted alpha of the **Rig Mask** input.
Frames Searched	framesSearched	Forward and Backward	Select whether to search forwards, backwards, or in both directions to find missing data. • **Forward and Backward** - searches before and after the current frame. • **Forward** - searches frames after the current frame. • **Backward** - searches frames before the current frame.
Frame Range	frameRange	4	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.
Frames Used in Range	framesUsed	Half of Frames	If the **Frame Range** is set to a large number, the rendering time can be prohibitive. **Frames Used in Range** 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. • **All Frames** - use every frame in the specified frame range to construct the repair. • **Half of Frames** - use every other frame in the specified frame range to construct the repair. • **Quarter of Frames** - use every fourth frame in the specified frame range to construct the repair.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **10% of Frames** - use every tenth frame in the specified frame range to construct the repair. • **Max 25 Frames** - use no more than 25 frames from the specified frame range to construct the repair. This option can be useful if **Frame Range** has been set to a very large number.
Max Rig Movement	maxRigMove	30	To avoid perspective changes, F_RigRemoval searches for the missing data inside an area immediately around the **RigRegion**. **Max Rig Movement** defines the width of this area (in pixels). Fast movement in the **Src** 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 **Rig Region** is set to **Box**. • **Rig Region BL** - controls the position of the bottom left corner of the rig region. • **Rig Region TR** - controls the position of the top right corner of the rig region.
Rig Region TL	regionTR	N/A	
Advanced			
Filtering	filtering	Medium	Sets the filtering quality. • **Low** - low quality but quick to render. • **Medium** - uses a bilinear filter. This gives good results and is quicker to render than high filtering. • **High** - uses a sinc filter to interpolate pixels giving a sharper repair. This gives the best results but takes longer to process.
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	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. **Note:** Disabling this control may speed up the general analysis.
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	This controls the range of frames any analysis runs over: • **Specified Range** - reads the **Analysis Start** and **Analysis Stop** fields for the range of frames to analyze. • **Source Clip Range** - automatically determines the range of frames to analyze from the length of the clip attached to the **Src** input.
Analysis Start	start	0	The first frame analyzed if **AnalysisRange** is set to **SpecifiedRange**.
Analysis Stop	stop	100	The last frame analyzed if **AnalysisRange** is set to **SpecifiedRange**.
Mode	mode	Smooth	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: • **Incremental Lock** - 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Absolute Lock** - 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. • **Smooth** - in which case, the shot is smoothed for a range of frames described by the **Smoothing** control. Use **Smooth** to keep the overall camera motion, but to smooth out sharp bumps and kicks.
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 BL** - controls the position of the bottom left corner of the analysis region. • **Analysis Region TR** - controls the position of the top right corner of the analysis region.
Analysis Region TR	regionTR	N/A	
Advanced			
Smoothing	smooth	10	Controls the range of frames to average motion over when **Mode** is set to **Smooth**.
Lock Frame	lockFrame	0	Controls the frame locked to when **Mode** is set to either

Control (UI)	Knob (Scripting)	Default Value	Function
			of the lock modes. **Note:** 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 **LockFrame** value.
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	Sets the filtering quality. • **Low** - low quality but quick to render. • **Medium** - uses a bilinear filter. This gives good results and is quicker to render than **High** filtering. • **High** - uses a sinc filter to interpolate pixels giving a sharper repair. This gives the best results but takes longer to process.
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 **Src** 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 **CleanPlate** 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. • **Two Points** - choose this if your wire is straight. • **Three Points** - choose this if your wire is a simple curve. • **Five Points** - choose this if your wire has an s-shaped curve.
On-Screen Wire	onScreenWire	Show	Sets the display mode for the on-screen wire tool. • **Show** - shows both points and lines. • **Hide** - hides both points and lines. • **Points only** - only shows the points.
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	Sets the output mode for F_WireRemoval. • **Source** - output the untouched source image. Use this output mode to position the on-screen wire tool over the wire you wish to remove. • **Repair** - output the repaired source image, with the wire removed from under the on-screen tool. • **Wire Matte** - 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. • **Repair Matted** - 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.
Track Range	range	Source Clip Range	Sets the range of frames to track the wire over. • **Specified Range** - use the **Track Start** and **Track End** controls to specify the range over which to track the wire. • **Source Clip Range** - track the wire over the entire range of the Source clip.
Track Start	start	0	Specifies the start of the tracking range when **Track Range** is set to **SpecifiedRange**.
Track End	end	100	Specifies the end of the tracking range when **Track Range** is set to **SpecifiedRange**.
Repair	repairMethod	Spatial	Sets the algorithm used to remove the wire from under the grain: • **Spatial** - 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

Control (UI)	Knob (Scripting)	Default Value	Function
			only. • **Temporal With Static Scene** - 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. • **Temporal With Moving Scene** - 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. • **Clean Plate** - 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.
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 **Temporal With Static Scene** or **Temporal With Moving Scene** 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
			Note: The **Spatial** repair mode does not benefit from **Luminance Correction**.
Lum Block Size	lumBlockSize	31.12	Altering the **Lum Block Size** could produce a better result if **Luminance Correction** 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	The position of the point on the wire between the start point and the mid point. This is only active if **Type** is set to **Five Points**.
Point 3	point3	N/A	The position of the mid point on the wire.
Point 4	point4	N/A	The position of the point on the wire between the mid point and the end point. This is only active if **Type** is set to **Five Points**.
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.

BigCat

BigCat (NukeX and Nuke Studio only) copies sequence-specific effects, such as garbage matting, beauty repairs, or deblurring, from a number of frames in a sequence and then trains a network to replicate this effect on the full sequence. BigCat outputs a trained network in a **.cat** file ready for the Inference node to apply your effect.

BigCat works similarly to CopyCat, but can work with larger data sets.

Learn more about the workflow at Using BigCat.

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.
	ValidationGroundTruth	Used to measure the model performance on unseen frames. These ground truth frames should not be included in your main ground truth dataset.
	validationInput	Used to measure the model performance on unseen frames. These input frames should not be included in your main input dataset. At each checkpoint interval the model will be applied to these frames, compared against the matching validationGroundTruth frames and the loss value plotted in the training graph. Use this to detect when the model is overfitting to the training dataset - meaning it will likely not perform well in other situations.

Control (UI)	Knob (Scripting)	Default Value	Function
BigCat Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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.

Control (UI)	Knob (Scripting)	Default Value	Function
			You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	on	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Data Directory	dataDirectory	N/A	Sets the location to which BigCat writes contact sheets and **.cat** files for use with an Inference node.
Epochs	epochs	10000	Sets the number of times BigCat 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: • **Channels** - the channels to process from the **Input** and **Ground Truth** respectively. • **Batch Size** - the **Advanced** > **Batch Size** dropdown controls this field. • **Total Steps** - the number of steps required to complete the specified number of **Epochs**. At each step, BigCat trains the network using random crop pairs from the **Input** and **Ground Truth** images divided by the **Batch Size**. Total Steps = Epochs * (Data Set) / (Batch Size) The **Data Set** is the number of **Input** and **Ground Truth** image pairs connected to BigCat.
Batch Size		0 (Auto)	
Total Steps		N/A	
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 **Data Directory**.
Verify Inputs	verifyInputs	N/A	Verify input data.
Create Inference	createInference	N/A	Click to add an Inference node to the Node Graph with the **Model File** control automatically referencing the correct **.cat** file for this BigCat node.
Advanced			
Initial Weights	initialWeights	None	Sets whether training begins from scratch or from weighting defined by a previous model: • **None** - the training begins from scratch with no weighting applied.

Control (UI)	Knob (Scripting)	Default Value	Function
			• **Checkpoint** - the training uses weighting from a previously trained **.cat** file, which is saved to the **Data Directory** every 1000 steps by default. **Tip:** You can change how often checkpoints are created using the **Checkpoint Interval** control. • **Deblur** - the training starts with a model weighted towards deblur effects, which can improve the training results for similar operations. • **Upscale** - the training starts with a model weighted towards upscaling, which can improve the training results for similar operations. • **Human Matting** - 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 **large**, **medium** and **small** model sizes (see Model Size).
Checkpoint File	checkpointFile	N/A	When **Initial Weights** is set to **Checkpoint**, enter the location of the **.cat** 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. **Small** models are faster to train and use the least GPU memory, but **Large** models may produce better results on complex tasks such as beauty work or when attempting to generalize for multiple shots.

Control (UI)	Knob (Scripting)	Default Value	Function
Batch Size	batchSizeType	Auto	Sets the number of image pairs to train the network with at each **Epoch** and is used to calculate the **Total Steps** required to complete the training run. `Total Steps = Epochs * (Data Set Size) / (Batch Size)` The **Batch Size** is calculated automatically using the available GPU memory by default.
	batchSize	N/A	When **Batch Size** is set to **Manual**, enter the batch size to use. Smaller **Batch Size** 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. **Note:** The **Batch Size** must be less than or equal to the number of image pairs in your data set.
Crop Size	cropSize	256	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. If you find that training takes a long time or uses too much memory, try reducing the **Crop Size** control. In our tests, the default **256** was suitable for most scripts, but data sets of larger images may require a larger **Crop Size** to train effectively.

Control (UI)	Knob (Scripting)	Default Value	Function
Checkpoint Interval	checkpointInterval	1000	Sets the number of steps between each checkpoint **.cat** file saved to the **Data Directory**. You can load **.cat** files into Inference nodes to check the progress of the training at each checkpoint on the full sequence.
Contact Sheet Interval	imageInterval	100	Sets the number of steps between each contact sheet **.png** file saved to the **Data Directory**. You can examine the contact sheets to judge whether the training is progressing as expected.
Use Multi-Resolution Training	useMultiResolutionTraining	on	Enabling multi-resolution training can speed up your training by up to two times. It does so by splitting the training into **three stages - low, medium, and high** resolution. During the low and medium-resolution stages, the input and ground truth **images are downsized** to 1/4 and 1/2 resolution respectively, allowing for fast training. In the final **high-resolution stage, the model is trained on full-resolution** input and ground truth images as regular CopyCat does, allowing the model to learn from the fine details and achieve optimal results. It is recommended that you **disable** multi-resolution training when using a **large dataset** of input and ground truth images (more than 100).

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **Data Directory**.
Live Updates		off	When on, live training data is polled from the distributed training network so that you can check training progress. **Live Updates** is off by default to avoid unnecessary data fetching from the network. **Note:** This control has no effect when you're training on your local machine.
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.

Control (UI)	Knob (Scripting)	Default Value	Function
Show Validation Curve	show Validation	on	When on, the graph shows the validation curves
[graph]	N/A	N/A	Displays Step/Loss data for all training in the specified **Data Directory**. You can use the curve to monitor training in real-time using the zoom controls above the graph.
Runs	runTable	N/A	Displays run data for all training in the specified **Data Directory**. 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 **Data Directory** by double-clicking on the **Name** field and entering your own string.
Data Augmentation Tab			
RGB Color Augmentation			
Enable	useRGBColorAugmentation	off	Whether to apply RGB color augmentation to the Input and GroundTruth images during training.
Gain Probability	gainProbability	0	The probability that the gain of an image will be augmented during training. The gain factor of each crop will be randomly chosen between [Gain Min, Gain Max].
Gain Min	minGain	0.5	Minimum gain factor applied to augmented images during training.
Gain Max	maxGain	2	Maximum gain factor applied to augmented images during training.
Contrast Probability	contrastProbability	0	The probability that the contrast of an image will be augmented during training. The

Control (UI)	Knob (Scripting)	Default Value	Function
			contrast factor of each crop will be randomly chosen between [Contrast Min, Contrast Max].
Contrast Min	minContrast	0.5	Minimum contrast factor applied to augmented images during training.
Contrast Max	maxContrast	2	Maximum contrast factor applied to augmented images during training.
Saturation Probability	saturationProbability	0	The probability that the saturation of an image will be augmented during training. The contrast factor of each crop will be randomly chosen between [Saturation Min, Saturation Max].
Saturation Min	minSaturation	0.5	Minimum saturation factor applied to augmented images during training.
Saturation Max	maxSaturation	2	Maximum saturation factor applied to augmented images during training.
Transform Augmentation			
Enable	useTransformAugmentation	off	Whether to apply transformation augmentations to the Input and GroundTruth images during training.
Horizontal (flop) Probability	flopProbability	0	The probability that a horizontal mirror (flop) will be applied to an image during training.
Vertical (flip) Probability	flipProbability	0	The probability that a vertical mirror (flip) will be applied to an image during training.
Rotation (±90°) Probability	rotationProbability		The probability that a rotation of ±90 degrees will be applied to an image during training.
Loss functions Tab (Adjust weights to balance contribution between different loss functions.)			

Control (UI)	Knob (Scripting)	Default Value	Function
Pixel Loss Functions			
L2 Weight	l2Weight	1	L2 (Mean Squared Error) measures average squared error between output and ground truth pixels. It heavily penalizes large errors.
L1 Weight	l1Weight	0	L1 (Mean Absolute Error) measures average magnitude of error between output and ground truth pixels. It is less sensitive to outliers and treats all errors linearly.
Perceptual Loss Functions			
Perceptual Loss	perceptualLossModel	None	Select pretrained model for perceptual loss calculation.
Perceptual Weight	perceptualWeight	0	Measures differences in high-level features between output and ground truth images using pretrained network.
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.

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/16.1/catfilecreationreferenceguide/index.html

Inputs and Controls

Control (UI)	Knob (Scripting)	Default Value	Function
CatFileCreator Tab			
TorchScriptFile	torchScriptFileKnob	none	Specifies the file path to the **.pt** TorchScript model that you want to encode in the **.cat** file.
Cat File	catFileKnob	none	Specifies the file path to the **.cat** file generated from the **.pt** file.
Channels In	channelsInKnob	none	A comma separated list that defines the names of the input channels that your model uses.
Channels Out	channelsOuKnob	none	A comma separated list that defines the names of the output channels that your model uses.

Note: Please refer to appendix in the Nuke CatFile Creation Reference Guide for the correct channel names and the order in which to use them.

Model ID	modelIdKnob	none	An optional user-defined ID to identify the model encoded in the **.cat** file.

Control (UI)	Knob (Scripting)	Default Value	Function
			Leaving this field blank stores an empty string in the **.cat** file.
Output Scale	Output Scale	1	Defines how much the width and height of the input images are scaled by the model. For example, setting the **Output Scale** 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. **Tip:** Click the **2** button in the **Properties** panel to scale the width and height independently.
Create .cat file and Inference	createCatFileKnob	N/A	Click to create a **.cat** file from the specified **.pt** file and an Inference node. The Inference node references the new **.cat** 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	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 the train the model. As the training progresses, the **Preview** image should move toward the ideal result defined by the **Ground Truth**. **Note:** This input is only visible when the **Input** and **Ground Truth** are connected.

Control (UI)	Knob (Scripting)	Default Value	Function
CopyCat Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device**

Control (UI)	Knob (Scripting)	Default Value	Function
			dropdown. Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	on	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Data Directory	dataDirectory	N/A	Sets the location to which CopyCat writes contact sheets and **.cat** 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: • **Channels** - the channels to process from the **Input** and **Ground Truth** respectively. • **Batch Size** - the **Advanced** > **Batch Size** dropdown controls this field. • **Total Steps** - the number of steps required to complete the specified number of **Epochs**. At each step, CopyCat trains the network using random crop pairs from the **Input** and **Ground Truth** images divided by the **Batch Size**. Total Steps = Epochs * (Data Set) / (Batch Size) The **Data Set** is the number of **Input** and **Ground Truth** image pairs connected to CopyCat.
Batch Size		0 (Auto)	
Total Steps		N/A	
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 **Data Directory**.
Create Inference	createInference	N/A	Click to add an Inference node to the Node Graph with the **Model File** control automatically referencing the correct **.cat** file for this CopyCat node.
Advanced			
Initial Weights	initialWeights	None	Sets whether training begins from scratch or from weighting defined by a previous model: • **None** - the training begins from scratch with no weighting applied. • **Checkpoint** - the training uses weighting

Control (UI)	Knob (Scripting)	Default Value	Function
			from a previously trained **.cat** file, which is saved to the **Data Directory** every 1000 steps by default. **Tip:** You can change how often checkpoints are created using the **Checkpoint Interval** control. • **Deblur** - the training starts with a model weighted towards deblur effects, which can improve the training results for similar operations. • **Upscale** - the training starts with a model weighted towards upscaling, which can improve the training results for similar operations. • **Human Matting** - 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 **large**, **medium** and **small** model sizes (see Model Size).
Checkpoint File	checkpointFile	N/A	When **Initial Weights** is set to **Checkpoint**, enter the location of the **.cat** 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. **Small** models are faster to train and use the least GPU memory, but **Large** 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
			network with at each **Epoch** and is used to calculate the **Total Steps** required to complete the training run. `Total Steps = Epochs * (Data Set Size) / (Batch Size)` The **Batch Size** is calculated automatically using the available GPU memory by default.
	batchSize	N/A	When **Batch Size** is set to **Manual**, enter the batch size to use. Smaller **Batch Size** 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. **Note:** The **Batch Size** must be less than or equal to the number of image pairs in your data set.
Crop Size	cropSize	256	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. If you find that training takes a long time or uses too much memory, try reducing the **Crop Size** control. In our tests, the default **256** was suitable for most scripts, but data sets of larger images may require a larger **Crop Size** to train effectively.

Control (UI)	Knob (Scripting)	Default Value	Function
Checkpoint Interval	checkpointInterval	1000	Sets the number of steps between each checkpoint **.cat** file saved to the **Data Directory**. You can load **.cat** files into Inference nodes to check the progress of the training at each checkpoint on the full sequence.
Contact Sheet Interval	imageInterval	100	Sets the number of steps between each contact sheet **.png** file saved to the **Data Directory**. You can examine the contact sheets to judge whether the training is progressing as expected.
Use Multi-Resolution Training	useMultiResolutionTraining	on	Enabling multi-resolution training can speed up your training by up to two times. It does so by splitting the training into **three stages - low, medium, and high** resolution. During the low and medium-resolution stages, the input and ground truth **images are downsized** to 1/4 and 1/2 resolution respectively, allowing for fast training. In the final **high-resolution stage, the model is trained on full-resolution** input and ground truth images as regular CopyCat does, allowing the model to learn from the fine details and achieve optimal results. It is recommended that you **disable** multi-resolution training when using a **large dataset** of input and ground truth images (more than 100).

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **Data Directory**.
Live Updates		off	When on, live training data is polled from the distributed training network so that you can check training progress. **Live Updates** is off by default to avoid unnecessary data fetching from the network. **Note:** This control has no effect when you're training on your local machine.
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
			specified **Data Directory**. You can use the curve to monitor training in real-time using the zoom controls above the graph.
Runs	runTable	N/A	Displays run data for all training in the specified **Data Directory**. 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 **Data Directory** by double-clicking on the **Name** field and entering your own string.
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	An optional image to use as a mask. By default, the effect 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 **mask** control is disabled or set to **none**.

Control (UI)	Knob (Scripting)	Default Value	Function
Deblur Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if**

Control (UI)	Knob (Scripting)	Default Value	Function
			available is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU.

Control (UI)	Knob (Scripting)	Default Value	Function
			Note: 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
mask	N/A	disabled	Enables the associated mask channel to the right. Disabling this checkbox is the same as setting the channel to **none**.
	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 **mask** input to the predefined **mask.a** 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. 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.

Note: Certain controls are not available in the timeline version of this node, such as GPU-related controls.

Inputs and Controls

Connection Type	Connection Name	Function
Input	Input	The image to which the CopyCat **.cat** file is applied.

Control (UI)	Knob (Scripting)	Default Value	Function
Inference Tab			
Local GPU	gpuName	N/A	Displays the GPU used for rendering when **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. **Note:** Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Model File	modelFile	N/A	The path to the CopyCat **.cat** file you want to use to

Control (UI)	Knob (Scripting)	Default Value	Function
			apply the effect modeled by the network. You can enter the file path manually or click the directory icon to browse to the **.cat** file's location.
Channels In	channelsIn	None	The channels the model expects as input.
Channels Out	channelsOut	None	The channels the model expects as output.
Optimize for Speed and Memory	inferencePrecision	disabled	When enabled, use 16-bit half-float precision instead of Nuke's standard 32-bit float precision. 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. **Note:** This control is hidden when **Use GPU if available** is disabled.

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 **Use GPU if available** is enabled. Local GPU displays **Not available** when: • **Use CPU** is selected as the **default blink device** in the **Preferences**. • no suitable GPU was found on your system. • 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. You can select a different GPU, if available, by navigating to the **Preferences** and selecting an alternative from the **default blink device** dropdown. Selecting a different GPU requires you to restart Nuke before the change takes effect.
Use GPU if available	useGPUIfAvailable	enabled	When enabled, rendering occurs on the **Local GPU** specified, if available, rather than the CPU. **Note:** 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 **--gpu** option. See Nuke's Release Notes pages for more information on the GPUs supported by your operating system.
Tile Size	tileSize	None	Controls how the input image is upscaled: • **None** - the full image is processed at once, which can use a large amount of GPU memory depending

Control (UI)	Knob (Scripting)	Default Value	Function
			on the image size. • **1024**, **2048**, **4096** - the image is processed in tiles of the selected size. These options allow you to process large images on machines with limited GPU memory.